

PennEast Pipeline Company, LLC
One Meridian Boulevard, Suite 2C01
Wyomissing, PA 19610



August 31, 2016

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

Re: PennEast Pipeline Company, LLC, Docket No. CP15-558-000
Responses to DEIS Recommended Conditions

Dear Ms. Bose:

On July 22, 2016, the Federal Energy Regulatory Commission (Commission) Staff issued its Draft Environmental Impact Statement (DEIS) for PennEast Pipeline Company, LLC's (PennEast) Project. The DEIS included recommended conditions requesting that PennEast provide certain information and develop specified mitigation measures by the end of the DEIS comment period on September 12, 2016 (Recommended Condition Nos. 15, 19, 20, 26, 32, 42, 43, 45, 53, and 54). PennEast hereby submits its responses to these recommended conditions contained in the DEIS (Responses). PennEast has enclosed a Table of Contents for this filing identifying all materials provided herewith.

Pursuant to Section 385.2010 of the Commission's regulations, 18 C.F.R. § 385.2010 (2015), PennEast is contemporaneously serving copies of the Responses to persons whose names appear on the Official Service List in this proceeding.

Should you have any questions concerning this filing, please contact me at (610) 406-4322.

Sincerely,
/s/ Anthony C. Cox
Anthony C. Cox
PennEast Pipeline Company, LLC,
By its Project Manager
UGI Energy Services, LLC

cc: Medha Kochhar (FERC)
All Parties of Record

Responses to Draft Environmental Impact Statement Recommended Conditions

August 31, 2016

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Draft Environmental Impact Statement

FERC Staff's Recommended Mitigation

Recommended Mitigation Item 15

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary the results of its ongoing evaluation of potential presence of working and abandoned mines near the proposed crossing of the Susquehanna River. The evaluation shall include documentation of coordination with the Pennsylvania Bureau of Abandoned Mine Reclamation, and shall identify any specific design or mitigation measures. (*Section 4.1.5.4*)

Response to Recommended Mitigation Item 15

PennEast Pipeline Company, LLC (PennEast) has provided herein as Attachment 1 a memorandum documenting the ongoing investigation of historic coal workings near the location where the proposed PennEast Pipeline Project (Project) will cross the Susquehanna River. The memorandum summarizes past and ongoing communications between PennEast and the Pennsylvania Department of Environmental Protection (PADEP) Bureau of Abandoned Mine Reclamation. It also summarizes PennEast's work in gathering, reviewing, and completing a thorough investigation of this area via inspection of historical mine records and records of past remediation activities. The memorandum also reviews how completed investigations have supported Project planning and pipeline routing to avoid historic mine features, including shifting specific Project components to avoid certain mine features.

Recommended Mitigation Item 19

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary documentation to identify any special construction procedures that will be implemented to minimize impacts on C-1 streams. PennEast shall provide documentation of consultation with appropriate federal and state agencies regarding C-1 streams, including identification of any agency recommendations and PennEast's responses. (*Section 4.3.2.2*)

Response to Recommended Mitigation Item 19

PennEast has identified the following special construction procedures that would be implemented to minimize impacts on Category 1 (C-1) streams: dry-crossing with reduced workspace, trenchless, and trenchless with a travel lane for construction equipment crossing of the waterbody. These procedures are described herein.

PennEast is proposing to minimize impact to C-1 waterbodies and associated riparian zones by locating temporary workspace in actively disturbed areas that have had been permanently or periodically cleared, cut, or otherwise altered. Where the riparian zone could not be avoided entirely, or where the riparian zone was not already located in an actively disturbed area, PennEast will reduce the workspace to 75 feet in width, and relocate additional temporary workspace (ATWS) areas to upslope or into actively disturbed areas, where practicable.

Dry-Crossing

The dry-crossing method would be utilized if streams are located within valleys, or vertical depressions, which are not conducive for trenchless technology. A dry-crossing will consist of reducing the workspace through the waterbody to a width of 60-feet. This width will be extended through the waterbody and will allow for excavation of the trench materials and placement of a timber mat bridge for equipment crossing. The workspace outside the waterbody will have a total width of 75 feet on both sides of the waterbody until actively disturbed areas are encountered. For a dry-crossing, PennEast will place ATWS for the waterbody crossing in the actively disturbed areas where practicable, and limit the forest clearing to no more than 75 feet wide between the waterbody and actively disturbed areas. Any workspace inside the waterbody will not exceed 60 feet in width. See Figure 1M of Attachment 2 for a typical workspace configuration for dry-crossings of C-1 waterbodies.

Trenchless; Trenchless with a Travel Lane

As part of the Clean Water Act Section 401 and 404 permit pre-application process, PennEast gave a presentation entitled “Trenchless Construction Methods” at the New Jersey Department of Environmental Protection’s (NJDEP) offices on April 27, 2016. The presentation was intended to provide information on the practical application of trenchless construction methods for gas pipeline installation; a copy of this presentation is included in Attachment 3. PennEast has evaluated considerations for trenchless crossing methodology for each C-1 waterbody crossed by the Project. In most cases, PennEast will implement a trenchless crossing where practicable. However, where site constraints are not favorable, PennEast will cross the waterbody with reduced workspace limits by use of a dry-crossing method, as described above.

Where terrain, pipeline alignment, and access to the workspace dictate, PennEast will utilize a trenchless crossing method (either utilizing a conventional bore or horizontal directional drill [HDD]) to cross the waterbody. This special construction procedure will not require tree clearing or workspace within the waterbody. PennEast will also minimize forested clearings to a 75-foot wide (total) workspace, where practicable. ATWS will be placed in actively disturbed areas. PennEast will utilize access to the workspace from both sides of the waterbody to avoid the need for tree cutting and timber mat bridge placement for travel lane logistics.

In some cases, PennEast will cross the waterbody using the trenchless method, but will cut trees and install a travel lane/equipment bridge to cross the waterbody with mainline construction equipment. This will be a result of limited access to workspace on both or either side of the waterbody. PennEast would limit tree cutting activities within the waterbody to a total width of 25 feet. The timber mat bridge would be removed should a rain event cause excessive flooding of the waterbody. See Figures 1N and 1P in Attachment 2 for a trenchless crossing without a travel lane/equipment bridge and a trenchless crossing with a travel lane/equipment bridge, respectively.

Although PennEast is committed to crossing C-1 waterbodies using either the boring and/or trenchless crossing methods, the construction contractor may employ a travel lane to locate the pipe, dig down to it, and install that portion to the mainline directly adjacent to it in the event that equipment encounters unforeseen issues during installation.

Recommended Mitigation Item 20

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary proposed crossing methods for all waterbodies, including those with contaminated sediments. The proposed method shall ensure that the potential suspension of sediments during construction shall be avoided or minimized to the greatest extent possible so as not to change bioavailability of any potential contaminants present. PennEast shall include documentation of consultation with pertinent agencies and identify any recommended minimization measures. (Section 4.3.2.2)

Response to Recommended Mitigation Item 20

PennEast filed in Attachment 2-2 of PennEast's May 16, 2016 Response (May Data Response) to FERC's Environmental Information Request, issued April 29, 2016 (April Data Request) its proposed crossing methods for all waterbodies in table 2A-1 (Pennsylvania Waterbodies Crossed by the Project Workspace) and 2A-2 (New Jersey Waterbodies Crossed by the Project Workspace). PennEast also provided the proposed crossing method for each impaired waterbody in a revised table 2.3-12 (Impaired Waterbodies Crossed by Pipeline Facilities) in Attachment 2-7 of the May Data Response. The crossing methods listed in table 2.3-12 correspond with those listed for the same waterbodies in table 2A-1 and table 2A-2. Of the 19 impaired streams listed in table 2.3-12, four (4) may contain contaminated sediments related to mercury and two (2) may contain contaminated sediments related to polychlorinated biphenyl (PCBs). The proposed pipeline crossing methods for all waterbody crossings include dry crossings (cofferdam, flumed, or dam and pump), conventional bore, or HDD. PennEast is not proposing any wet crossings, which will avoid or minimize the potential suspension of contaminated sediments. The specific crossing methods for streams that may contain contaminated sediments are described below.

HDD Crossings and Related Agency Consultation

PennEast proposes to cross four (4) of the six (6) impaired streams that may contain contaminated sediments using HDD: Wild Creek/Beltzville Lake, Pohopoco Creek/Beltzville Lake, Lehigh River, and Delaware River. By using this trenchless crossing technique, direct impacts to the stream and river bottoms should be avoided and contaminated sediments that could adversely impact water quality should remain undisturbed. In the event that an inadvertent release occurs within the waterbody during HDD construction, PennEast will implement its Inadvertent Release and HDD Contingency Plan

and dispose of any potentially contaminated mud or sediment at an approved facility capable of accepting PCBs or mercury. PennEast addressed the impaired statuses of the three (3) waterbodies located in Pennsylvania and the Pennsylvania portion of the Delaware River crossing as part of the Environmental Assessments contained in PennEast's Joint Permit Applications (JPAs) with the Pennsylvania Department of Environmental Protection (PADEP) and the United States Army Corps of Engineers (USACE), submitted on February 5, 2016. PennEast also submitted site-specific crossing drawings and its Inadvertent Return and HDD Contingency Plan with the JPAs. At this time, PennEast has not received technical comments on the JPAs.

The New Jersey portion of the Delaware River crossing will require a Flood Hazard Area Control Act (FHACA) Individual Permit application. The proposed HDD crossing methodology will be discussed with the NJDEP as part of the pre-application process for the Project's Clean Water Act Section 401 and 404 permits. Mitigation measures for dealing with contaminated sediments in the event of inadvertent returns will be addressed for the FHACA application, and will be in accordance with NJDEP's Linear Construction Technical Guidance document.

Dry-Ditch Method (Open Cut; Dam & Pump-Around) Crossings and Related Agency Consultation

The remaining two (2) streams that may contain contaminated sediments are the Susquehanna River and Jacobs Creek. These waterbodies will be crossed using cofferdams and the dam and pump method, respectively. By implementing dry crossing techniques, the workspace will be isolated from the stream during construction as stream flow is diverted or pumped around the workspace. Stream flow will only be restored once the crossing is constructed and the stream beds and banks are restored. Isolating these areas from stream flow will minimize suspension of any contaminated sediment during construction.

Prior to construction, PennEast will sample sediment within the proposed workspace at the Susquehanna River. The samples will be collected, sent to an approved laboratory, and analyzed for PCB concentration. In the event that PCBs are found to be present within the Project area, PennEast will consult with the appropriate agencies to determine whether the level of concentration present would warrant PennEast to take additional precautions to prevent releasing PCBs into the water column. PennEast presented this sampling plan in the Environmental Assessment submitted to the PADEP and USACE in PennEast's Luzerne County JPA. PennEast also submitted a site-specific crossing plan with its Luzerne County JPA.

Prior to construction, PennEast will sample sediment within proposed Jacob's Creek workspace. The samples will be collected, sent to an approved laboratory, and analyzed for potential contaminated sediment. In the event that contamination is identified in the workspace, PennEast will consult with the appropriate agencies to determine whether the level of concentration present that would warrant PennEast taking additional precautions to prevent releasing the contaminated sediment into the water column. PennEast will discuss the proposed Jacob's Creek crossing with the NJDEP as part of the pre-application process for the Project's Clean Water Act Section 401 and 404 permits. Mitigation measures for dealing with contaminated sediments if encountered will be addressed in the FHACA application, in accordance with NJDEP's Linear Construction Technical Guidance document.

Recommended Mitigation Item 26

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary the special construction methods that it will implement during construction in extremely saturated wetlands. If additional workspace is required at the saturated wetlands along the pipeline alignment, PennEast shall identify these in a table and provide site-specific justification for the additional workspace. (*Section 4.4.2*)

Response to Recommended Mitigation Item 26

As identified in Section 4.4.2 of FERC's Draft Environmental Impact Statement (DEIS), PennEast is aware that extremely saturated soils have been identified in the wetland immediately south of Interstate 80 (wetland 102314_JC_002_PSS). Based on this information and the results of preliminary exploratory geotechnical investigation, PennEast intends to cross this wetland using the HDD method. PennEast is developing a proposed crossing design based on the remaining geotechnical investigations. Since PennEast intends to cross this wetland using an HDD, no additional workspace is required at the saturated wetlands along the pipeline alignment.

At this time, PennEast is not aware of any other wetlands with extremely saturated soils. Should additional wetlands be identified, PennEast will utilize either the HDD or "push-pull" techniques, depending on the surrounding geotechnical conditions and topography. PennEast described the HDD installation technique in Resource Report 2, Section 2.3.2.2 of its September 24, 2015 Certificate Application Filing (September 2015 Application). The push-pull technique is described herein.

Push-Pull Technique

PennEast may cross extremely saturated (or "inundated") wetlands using the push-pull technique. The push-pull technique is used in large wetland areas where sufficient water is present for floating the pipeline in the trench and grade elevation over the length of the push/pull area. It will not require damming to maintain adequate water levels for pipe floatation. Push-pull techniques involve pushing the prefabricated pipe from the edge of the wetland or pulling the pipe with a winch from the opposite bank of the wetland into the trench. During implementation of this technique, initial clearing within the wetland will be minimized. The width of the right-of-way (ROW) cleared will be limited to only that necessary to install the pipeline.

Grading in inundated wetlands will be held to a minimum and generally will not be necessary due to the level topography and the absence of rock outcrops in such areas. Timber mats may be placed over existing vegetation where grading is not required. Trees and brush will be cut at ground level by hand, with low ground pressure equipment, or with equipment supported by timber mats. PennEast will not use dirt, rock, pulled tree stumps, or brush rip-rap to stabilize the travel lane and sediment barriers will be installed prior to grading, as needed, to protect adjacent wetland areas.

The trench for a push-pull installation, will be excavated using amphibious excavators (pontoon mounted backhoes) or tracked backhoes (supported by fabricated timber mats or floats). The excavated material will be stored adjacent to the trench (if possible). If storage of excavated material next to the trench is not possible, the material will be temporarily stored in one of the following locations: (1) in upland areas of the ROW as near to the trench as possible; (2) in construction vehicles; or (3) transported to an approved off-site staging location until needed for backfilling. The pipe will be stored and welded at staging areas (push-pull sites) located outside the wetland. Floats may be attached temporarily to give the pipe positive buoyancy.

After floating the pipe into place, these floats will be cut and the negatively buoyant pipe will settle to the bottom of the ditch. This operation will be repeated, with pipe sections fabricated, pushed into place, and welded together, until the wetland crossing is complete. The excavated material will then be placed over the pipe to backfill the trench and wetland restoration will take place.

Recommended Mitigation Item 32

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary the measures or changes that it will implement to the Project's design in order to ensure that the Project is consistent with the FWS requirement to avoid all bat hibernacula by at least 0.25 mile. PennEast shall also provide documentation of the consultation with the FWS on this restriction. (*Section 4.6.1.1*)

Response to Recommended Mitigation Item 32

PennEast continues to coordinate with the United States Fish and Wildlife Service (USFWS) Pennsylvania Regional Office (PA) and the Pennsylvania Game Commission (PGC) regarding bat concerns. PennEast held a teleconference with Ms. Pamela Shellenberger, USFWS (PA), on August 15, 2016. During this call, PennEast requested the USFWS' input on the status of their impact review for bats and discussed avoidance and minimization measures related to the known hibernacula. Related correspondence with the USFWS on this issue, including a summary of the most recent telecommunication, is provided in Attachment 4. Ms. Shellenberger noted that the USFWS now has the additional information that it requested in a May 2016 communication. There are two (2) primary areas of potential concern relative to bat hibernacula: Tunnel 34 and the Durham Caves (#1 and #2).

Tunnel 34

After reviewing PennEast's maps and figures provided, Ms. Shellenberger concurred that the Project's work area is outside of the 0.25-mile buffer for bat hibernacula. It does not appear that there are any underground mines or caves that could affect bats, based on the database information. Ms. Shellenberger stated her intent to consult with PGC with respect to this hibernaculum and its underground extent. With respect to tree clearing, no impacts are anticipated here, and the Project is expected to comply with the USFWS's finalized rule under section 4(d) of the Endangered Species Act of 1973 (Final 4(d) Rule), effective February 16, 2016, regarding protections for the northern long-eared bat. PennEast continues to coordinate with the USFWS regarding potential minimization measures, which may include seasonal restrictions on drilling, boring, or blasting in this vicinity (i.e., activities would need to take place outside of the hibernation season, which is expected to be November 1 through March 31 based upon the summer roosting season), vibration monitoring, and, if access is available, temperature/humidity monitoring before, during, and after construction to assess potential underground impacts to the hibernacula.

Durham Caves

The USFWS is assuming that northern long-eared bats are present in the Durham Caves, regardless of outside factors (i.e., white-nose syndrome). Tree clearing is not expected to impact the Durham Caves, as the proposed HDD work area and pipeline is primarily within an active agricultural field, and would be in compliance with the Final 4(d) Rule. USFWS concurs that existing farming activities may cause certain levels of vibration within the Durham Caves and will likely request monitoring, as noted above, to assess existing levels and compare to construction vibration data in order to determine impact or effect. Per their request, PennEast will provide USFWS with reports of seismology studies conducted near the hibernacula. In addition, PennEast is assisting with coordination with property owner(s) relative to background information about the caves.

To support a finding that the Project is not likely to adversely affect the northern long-eared bat in the bat hibernacula located within 0.25 mile of the Project work area, PennEast continues to coordinate with USFWS regarding potential minimization measures, which may include seasonal restrictions on blasting, drilling, or boring, as described above, as well as vibration monitoring, and, if access is available, temperature/humidity monitoring before, during, and after construction to assess potential underground impacts to the hibernacula. PennEast will file with FERC the construction and mitigation measures that it will implement in order to ensure that the Project is consistent with USFWS requirements. PennEast will also provide further documentation of the consultation with USFWS on these restrictions.

Recommended Mitigation Item 42

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary any route adjustments, workspace modifications, or mitigation measures developed through PennEast's ongoing consultations with landowners regarding the following planned and/or pending projects:

- a) Fields at Trio Farms Subdivision;
- b) Huntington Knolls, LLC Housing Development; and
- c) Hopewell Township Emergency Services Facility.

PennEast shall provide documentation of correspondence with these landowners. PennEast shall either incorporate these deviations or a route that avoids the resources of concern, or otherwise explain how potential impacts on resources have been effectively avoided, minimized, or mitigated. (*Section 4.7.3.2*)

Response to Recommended Mitigation Item 42

Proposed Development "Fields at Trio Farms Subdivision"

PennEast provided a history of its correspondence with the land developer of the Fields at Trio Farms Subdivision in its May Data Response to Data Request 8-5. As stated in that response, PennEast obtained a copy of the development plans for the planned subdivision to aid in determining route modifications to minimize impacts to the proposed development plans. Based on review of the proposed development plans, PennEast is evaluating and finalizing a minor route modification to relocate the proposed pipeline by approximately 85 feet to the east. PennEast will file the figures, alignment sheets, and tables related to this and other route modifications in a September 2016 filing. This route modification will reduce the amount of proposed permanent easement on the developable lots of the Fields at Trio Farms Subdivision. Based on the concerns raised by the developer that PennEast has been made aware of, as described in the May Data Response, it is PennEast's understanding that the route modification addresses those concerns.

Huntington Knolls, LLC Housing Development

As described in PennEast's May Data Response to Data Request 8-6, PennEast has communicated with the Huntington Knolls, LLC Housing Development landowner primarily through in-person meetings and phone conversations, beginning with initial contact in August 2014. After several conversations and in-

person meetings to discuss various routing options and the landowner's development plans, PennEast evaluated and adopted several route modifications to avoid conflicts with the proposed development in this area at the landowner's request (filed as Deviation Nos. 51-54 of Appendix P in PennEast's September 2015 Application). These adopted route modifications avoid impacts to the landowner's development plans and address the landowner's concerns about which PennEast is aware.

Hopewell Township Emergency Services Facility (Emergency Services Facility)

As described in PennEast's May Data Response to Data Request 8-7, PennEast had an in-person meeting with the Hopewell Township Administrator and solicitor to discuss the planned development of the Emergency Services Facility. Since that meeting, Hopewell Township has not contacted PennEast with any additional concerns regarding future development of the Emergency Services Facility.

Based on the proposed conceptualized sketch of the Emergency Services Facility located on Hopewell Township Tax Block 91, Lot 3.02 filed in this proceeding (FERC accession number 20151215-5202), PennEast is proposing to change the construction method on Lot 3.02 to allow flexibility in the pipeline installation methodology, as depicted in Attachment 5. PennEast has changed the proposed HDD that crossed the CSXT railroad tracts at mile post (MP) 112.3 to be a conventional bored crossing. By implementing this change, workspace flexibility is optimized on Block 91, Lot 3.02. Additionally, PennEast has located the proposed pipeline centerline approximately 10 feet inside an existing powerline easement, thus requiring only 15 feet for a proposed permanent easement outside of the existing powerline easement. PennEast currently has a typical construction workspace configuration across Block 91, Lot 3.02 for pipeline installation. However, if the Emergency Services Facility is constructed before the PennEast Pipeline is constructed, PennEast will coordinate with Hopewell Township to develop a reduction in workspace to minimize disruption to the Emergency Services Facility. This would include, but not be limited to, reducing the temporary workspace and additional temporary workspace to avoid the Emergency Services Facility access driveway and communication tower. Based on the concerns raised by Hopewell Township that PennEast has been made aware of, it is PennEast's understanding that the modifications described above address those concerns.

Recommended Mitigation Item 43

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary an update of the status of the development of the site-specific crossing plans for each of the recreation and special interest areas listed as crossed by the Project or otherwise affected in appendix G-14. The site-specific crossing plans shall include, as applicable:

- a) site-specific timing restrictions;
- b) proposed closure details and notifications (e.g., reroutes, signage, public notices);
- c) specific safety measures; and/or
- d) other mitigation to be implemented to minimize effects on the recreation areas and their users during construction and operation of the Project. (*Section 4.7.5*)

Response to Recommended Mitigation Item 43

PennEast has developed site-specific crossing plans for the public recreation and special interest areas listed in Appendix G-14 and for three (3) additional privately-owned recreation/special interest areas that were not included in Appendix G-14: Blue Mountain Ski Area, Calvary Baptist Church, and Jacob's Creek Trail.

There are several county- and municipal-owned lands listed in Appendix G-14 that are not recreation areas but have been acquired by counties and municipalities to improve existing land uses, increase quantities of preserved lands, and provide protection to public water supply reservoirs. As these lands have not been designated as recreation areas, PennEast does not anticipate having to employ timing restrictions, closures, or property-specific safety measures beyond what will be employed for the overall Project and has not created site-specific crossing plans for such preservation areas.

Site-specific crossing plans for all designated recreation areas are provided herein as Attachment 6. PennEast continues to work with public and private landowners to determine mitigation measures that will minimize impacts during Project construction and operation. Mutually-agreeable mitigation measures will be finalized during the licensing process.

Recommended Mitigation Item 45

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary documentation of USDA approval for construction and operation of the Project within any and all parcels affected that have active USDA conservation easements. Alternatively, PennEast shall identify any Project changes made to avoid parcels with USDA conservation easements, and include documentation of consultation with the USDA that confirms avoidance of USDA conservation easements. (*Section 4.7.5.4*)

Response to Recommended Mitigation Item 45

Pennsylvania

PennEast reached out to Ms. Hathaway Jones with the Pennsylvania Natural Resources Conservation Service (NRCS) on June 16, 2016 to discuss the parcel identified in DEIS Section 4.7.5.4 that is encumbered by a United States Department of Agriculture (USDA) Farm and Ranch Land Protection Program easement. Ms. Jones stated that, as long as PennEast will have a standard construction corridor without staging yards or access roads, the NRCS finds the route to be acceptable and will allow PennEast to cross the parcel. Accordingly, PennEast is maintaining the proposed alignment for that parcel.

PennEast notes that the DEIS identifies a second property in Pennsylvania with a USDA easement; however, the second parcel is the same as the one discussed with Ms. Hathaway, as described above, and there are no other parcels in Pennsylvania with USDA easements that will be impacted by the PennEast Project.

New Jersey

PennEast has been in communication with the New Jersey division of the USDA throughout Project development. PennEast is evaluating and finalizing a route modification to avoid the USDA-encumbered parcels in New Jersey. PennEast will file the figures, alignment sheets, and tables related to this and other route modifications in a September 2016 filing. That filing will also include documentation of PennEast's consultation with the USDA that confirms that PennEast's route modifications will avoid the New Jersey parcels encumbered with USDA easements.

Recommended Mitigation Item 53

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary proposed mitigation measures to minimize noise levels associated with emergency or maintenance MLV blowdown events. Mitigation measures may include but not be limited to use of a silencer, restricting maintenance blowdowns to daytime hours only, and/or notifying landowners in the immediate area of the planned blowdown event. (*Section 4.10.2.3*)

Response to Recommended Mitigation Item 53

PennEast addressed noise mitigation associated with maintenance MLV blowdown events in its Supplemental Responses to FERC's February 10, 2016 Data Request and the April Data Request, filed on August 5, 2016 (August Supplemental Data Response). With respect to emergency blowdown events, PennEast will need to take immediate action to resolve the emergency event, and to the extent practicable, PennEast will implement the mitigation measures associated with maintenance blowdown events described in PennEast's August Supplemental Data Response.

Recommended Mitigation Item 54

Prior to the end of the draft EIS comment period, PennEast shall file with the Secretary a complete noise analysis of the Project metering (interconnect) stations using the best available typical design or vendor specification with regards to impacts on the closest identified residences/NSA as shown in table 4.10.2-10. (*Section 4.10.2.3*)

Response to Recommended Mitigation Item 54

PennEast filed a complete noise analysis of the Project's metering (interconnect) stations using the best available typical design with regards to impacts on the closest identified residences/NSA, as shown in table 4.10.2-10 of PennEast's August Supplemental Data Response.

Attachment 1:

Memorandum – Investigation of Historic Coal Mining
Proximate to the Susquehanna River

To Jeff England
From Vatsal A. Shah, Ph.D, P.E. and Dafydd N. Chandler, MS
Date August 30, 2016
Project # 353754
Document # 353754-MM-E-E-056 RevC
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Subject PennEast Pipeline Project- Investigation of Historic Coal Mining Proximate to the Susquehanna River
CC PennEast- M. Calderon, J. Doersom, T. Bernstein, A. Cox
MM- Mike Wilcox, Danny Hartman

Overview

The following project memorandum serves to document the on-going investigation of historic coal workings near the proposed crossing of the PennEast Pipeline near the Susquehanna River. This memo specifically focuses on historic mining beneath the River and within 1,000 feet radially from this area. PennEast has conducted and continues to gather, review, and complete a thorough investigation via inspection of historical mine records, records of past remediation activities, and discussions with the Pennsylvania Department of Environmental Protection (PADEP) Bureau of Abandoned Mine Reclamation.

Where the Pipeline has the potential to intersect historic mine workings, PennEast plans to conduct field investigations where necessary to validate the historic information gathered and calibrate its understanding as it pertains to Pipeline planning, routing, and construction. PennEast commenced a physical investigation program on August 29, 2016 with a borehole being advanced on the southern bank on the Susquehanna River. Once results of the boring are finalized, PennEast will provide an updated revision of this memo.

1. Historical Setting

The mining of anthracite coal in Pennsylvania began in the 1800s and was the first large-scale coal mining operation undertaken in the Americas. Anthracite was mined in several separate fields in North Eastern Pennsylvania. The PennEast Pipeline crosses the area known as the Northern Anthracite Field.

The mining operations within the Northern Anthracite field were divided into separately operated Collieries. In the location at where the PennEast project crosses the Susquehanna River, the workings of two Collieries are of relevance. The Westmoreland Colliery operated to the north of the River and the Penna No. 14 Colliery operated to the south and directly beneath the River. An unworked zone existed between collieries to isolate ventilation and drainage system. These unworked zones form barrier pillars which are approximately 125 feet thick. Discussions with the DEP indicate these barriers may be worked thinner than records indicate or even breached by illegal mining.

The underground mining in this area was conducted through traditional room and pillar method. Secondary mining was also a common method in these operations.

To Jeff England
Date August 30, 2016
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Secondary mining (robbing) was a procedure that would extract remaining coal which acted originally as support pillars once primary extraction was finished. This would typically result in the collapse of the workings and abandonment of the mine area. In addition, where coal seams came close to the surface, strip mining was also frequently conducted. Strip mining may occur at a different time period to underground mining.

The primary phase of working in this area was from the 1920's to 1950's. The termination of mining in the region can partially be attributed to the Knox Mine Disaster of 1959 in which twelve miners died. The disaster was caused when the roof of the River Slope mine collapsed and an estimated 10 billion gallons of water from the Susquehanna River flooded the mine. The 35 foot minimum roof thickness regulation was ignored and, at approximately a 6 foot thickness, the roof failed and the River broke through. This disaster occurred around one mile away from where the PennEast project crosses the Susquehanna River. However, at the point of PennEast's crossing, there is a vertical separation greater than this minimum roof thickness (at least 53 feet) between proposed pipe bed and top of nearest worked coal seam, the Hillman seam. The Hillman seam is not expected to have existed or been mined at a location below the River and is discussed in further detail in Section 4.

2. Geological Setting

The Geologic Map of Pennsylvania (1980) names the bedrock beneath the Wyoming Valley as the Llewellyn Formation. The formation is described as typically gray, fine to coarse-grained sandstone, siltstone, shale, conglomerate, and numerous anthracite coal in repetitive sequences. This geological unit is of Pennsylvanian age. The Pennsylvanian age is a sub division of the Carboniferous period and represents the time period of approximately 323 to 298 million years ago.

On a macro scale, the bedrock beneath the Wyoming Valley forms a large syncline structure. The limbs of the syncline outcrop along the valley sides and the central beds are relatively flat. On a local scale, beds are deformed and faulted into complex structures. The anthracite coal present within this valley is of high economic value due to its high purity and high calorific value. These coal recourses are formed by lithification and metamorphic conditions beyond those required to produce bituminous coals.

3. Data Sources and DEP Consultations

PennEast held discussions with the PADEP Bureau of Abandoned Mine Reclamation (PADEP BAMR) during March, April, May, June and July 2016. Project representatives visited the Department's office in Wilkes Barre on April 28th and July 6th, 2016.

During these visits, discussions were held with Mike Walsh and Bernard Walko. Data was obtained from the Department including historical underground mine working maps and records and details of remedial projects carried out in the area post closure. In addition to the printed maps obtained from the PADEP BAMR, an extensive catalog of maps maintained by the PADEP is available on the Pennsylvania Mine Map Atlas. Historic maps from this source were used to provide supplementary details. Along with mapping, Colliery inspection reports were consulted to provide additional details on mine shafts and working dates and contextual information.

To Jeff England
Date August 30, 2016
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The location at which the PennEast project crosses the Susquehanna River is referred to by the PADEP as Abandoned Mine Lands Inventory System (AMLIS) Area code PA2172, Port Blanchard Southwest. The southern side of the river contains AMLIS problem feature PA2172#01, "Vertical Mine Shafts". These AMLIS locations are a generalized indication of the vicinity and types of hazards which exist, however, it should be noted their coordinates do not indicate the precise location of a hazardous feature, but rather an area. Section 5 provides supporting evidence that this feature, which exists in the general area, does not exist at the specific location of the proposed pipe crossing.

4. Coal Seams

Table 1 presents a list of named coal seams which are present beneath the Susquehanna River or surrounding areas and notes their thickness, elevation ranges, and approximate worked dates.

Table 1 - List of Coal Seams Proximate to Susquehanna River

Coal Seam Name	Typical Thickness*	Worked Depth Ranges	Approximate Worked Dates	Notes
Hillman	8 feet	Surface to 70 feet	1910's to 1950's.	Only present south of the River. Subcrop approximated to southern River bank. Workings to not extend beneath River.
Diamond	5 feet	Surface to 120 feet	1910's to 1950's.	
Top Checker	5 feet	130 feet to 250 feet	1900's to 1950's	Worked beneath the River by No. 14 colliery. Not worked by Westmoreland colliery.
Bottom Checker	5 feet	120 feet to 250 feet	1900's to 1950's	
Pittston	9 feet	280 feet to 350 feet	1920's to 1960's	Extensively worked by beneath River and by both collieries north and south of the River.
Marcy	5 feet	320 feet to 410 feet	1940's to 1960's	
Top Clark aka Top Ross	5 feet	380 feet to 500 feet	1940's to 1950's	Worked to limited extent beneath River and on both sides.
Bottom Clark aka Bottom Ross	4 feet	404 feet to 500 feet	1940's to 1950's	
Top Red Ash aka Babylon	4 feet	540 feet to 640 feet	1940's	
Bottom Red Ash	6 feet	540 feet to 640 feet	1930's to 1950's	

*Coal seam thickness is locally variable.

Figure 1 displays a cross section of coal workings beneath the alignment near the Susquehanna River. The depth to rock head was obtained from inspection of coal exploratory borehole notes. At Project milepost (MP) 7.25, the Hillman coal seam intersects the top of rock at an elevation of approximately 510 feet; however, at this location it should be noted the seam is not worked. The closest worked coal seams occur at Project MP 7.27. At this location the workings of the Hillman seam lay at approximately 65 feet below the surface. Approximately 40 feet of this cover is surficial deposits, in addition to 25 feet of rock cover.

To Jeff England
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Figure 1: Coal Seam Cross Section at Susquehanna River Crossing

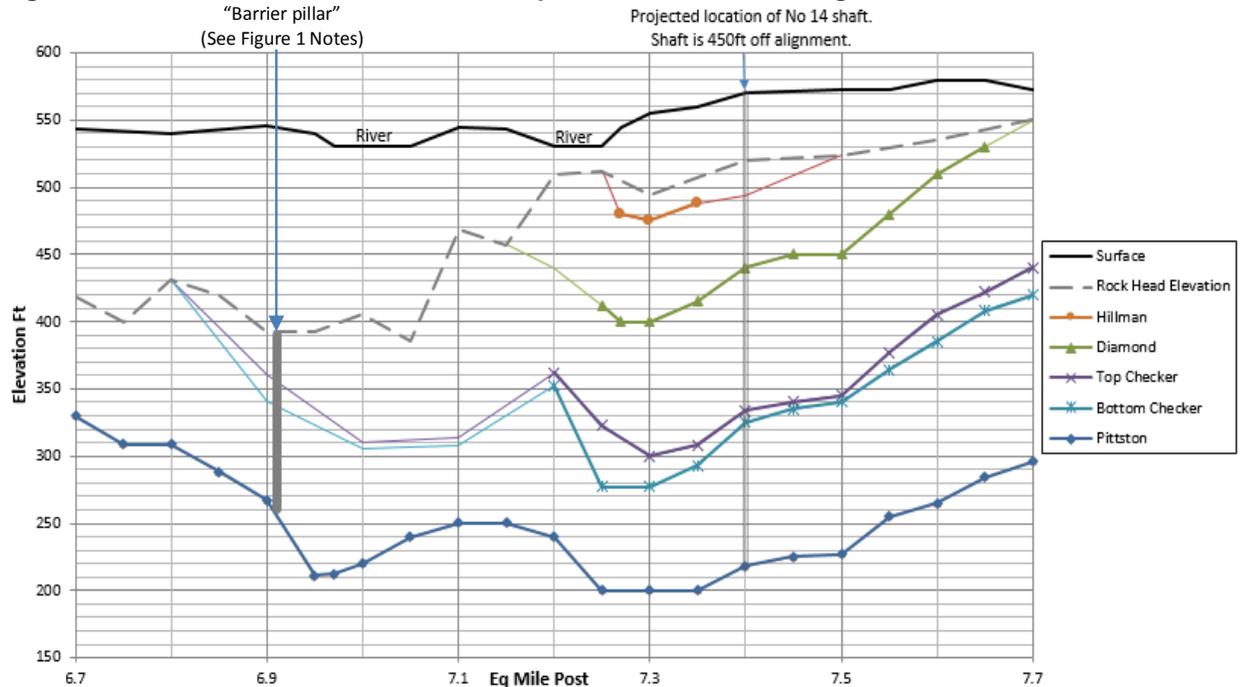


Figure 1 Notes:

- > Bold/heavy lines indicate coal seams which have been worked
- > Light lines indicate estimated seam continuation based upon coal industry exploratory boreholes and extrapolation from adjacent workings.
- > Elevations based upon historical mine map records. Rockhead elevations extracted from coal mining exploratory boreholes.
- > Deeper worked coal seams exist but are not displayed on this diagram.
- > A “barrier pillar” is an untouched thickness of rock and/or coal intended to serve as a legal boundary wall between colliery operations. The pillar was also intended to act as a barrier to flow. May also be referred to in modern terminology as a “no take wall”.
- > Equivalent Mile Post abbreviated as Eq Mile Post in above Figure.

As mentioned previously, illegal and unrecorded mining did occur within this coal region. However, it is not believed that the Hillman seam could have been illegally mined out under the river beyond the mapped extents. The terminations of the workings appear to be naturally controlled, and not legal or permitting constraints which could have been violated.

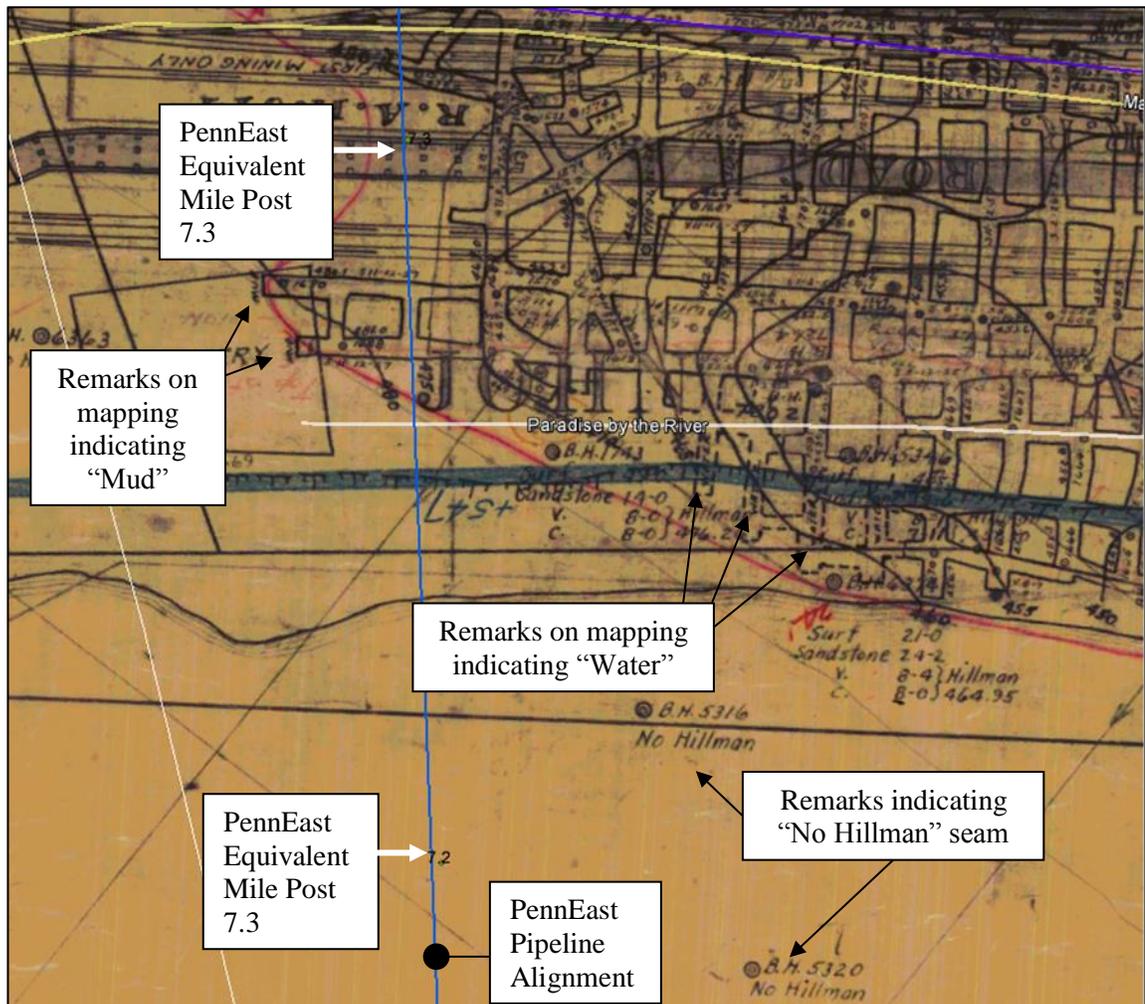
To Jeff England
Date August 30, 2016
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Review of the area's historic mine maps indicate the absence of a workable Hillman seam in two ways:

>First- A number of exploratory boreholes record notes indicating, "No Hillman" in locations beneath the river. It is therefore likely that the seam was not present beneath the river and pinched out geologically at the riverbank.

> Second- Remarks on historic mapping at termination of the workings contains notations of "Mud" or "Water", indicating the workings ran into ground conditions making it infeasible or impossible to continue extraction. Figure 2 is extracted from maps of the Hillman Seam obtained from PADEP.

Figure 2: Extract of Hillman Coal Seam Historic Map



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5. Mine Portals

Historical review of the above mentioned sources revealed the following mining entrance ways were present in the area near the Susquehanna River:

No. 14 Shaft - Approx. 450 feet away from Pipeline Centerline at MP 7.5

Document review indicates the No. 14 shaft is 365 feet deep and was used to access the Pittston coal seam. The shaft contained five separate winching compartments and had a surface opening size of approximately 12 feet by 50 feet. No remediation or backfilling records were located during document review.

The shaft may have been backfilled during colliery closure or subsequent site grading operations, but no confirmatory documentation of this was located. Discussions with the DEP indicated that some shafts were capped off a few feet below the surface with timber boards upon which backfill was placed. There is an obvious current-day topographic expression of the No.14 shaft which can be seen by both aerial photography and survey contours. The original concept layout for PennEast Wareyard PA-A-04 overlapped with the No. 14 Shaft. However, through investigation and recognition of this feature, the proposed location of this Wareyard has been adjusted to place its boundary greater than 150 feet away from the mapped location of this shaft.

No. 14 Air Shaft - Approx. 220 feet away from Pipeline Centerline at MP 7.5

This shaft was used to provide ventilation to the deep workings. A fan house sat atop the shaft as marked on the historic maps. The details of this shaft are not as well documented than the primary No. 14 shaft. The shaft is thought to be approximately 6 feet square, but no specific details were uncovered. There is no obvious current modern day expression of the air shaft's location.

The original concept layout for Project Wareyard PA-A-04 overlapped with the No.14 Air Shaft, however, the shift of the Wareyard, as discussed above, has placed its boundary greater than 100 feet away from the air shaft's location.

The Hillman Slope - Approx. 160 feet away from Pipeline Centerline at MP 7.35

Mine slopes are inclined entrance ways. Inclined at an angle of approximately 45°. They present less of a severe, specific hazard than vertical shafts/entranceways. There is no obvious modern day surface expression of the Hillman Slope. It is possible that the entrance way was backfilled during later strip mining operations, colliery closure, or site grading. This feature remains within the boundary of Wareyard PA-A-04. PennEast intends to complete site investigation to assess the current day condition of this feature.

Red Ash Shaft - Approx. 430 feet away from Pipeline Centerline at MP 7.4:

The Red Ash Shaft is mapped to have contained two separate winching compartments and had a surface opening size of approximately 12 feet x 24 feet. The shaft is approximately 600 feet deep, which allowed access to the Red Ash coal seams, which are the deepest worked seams in this location. There is a modern day surface expression of the possible location of this shaft. No Project work is planned at the location of this shaft, and the pipeline remains a sufficient distance away to avoid influence from this feature.

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Date August 30, 2016
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6. Discussion of Mapped Workings With Respect to the Project Alignment

As discussed, the historic mine shafts which exist in close proximity to the River (No. 14 Shaft and Red Ash shaft) are not intersected by the currently proposed Project alignment. At the specific crossing of the Susquehanna River, there is estimated to be over 65 feet of clearance between the ground surface and previously worked coal seams. This is sufficient clearance to ensure that trenching operations will not intersect historic workings. Monitoring will be carried out for any settlement issues and appropriate measures taken where necessary. Where features have existed within a close proximity of planned Project work, PennEast has implemented its on-going understanding and investigation of these historic features to plan around these features.

PennEast continues to investigate this important regional geohazard, and implement field investigations and project routing to support the design and planning for construction and long-term operation of the Pipeline.

Please contact us at your convenience if you have any questions regarding the content of this memo.

Sincerely,



Vatsal A. Shah, Ph.D, P.E.
Senior Project Engineer
PA PE No. PE079626



Dafydd Chandler, MS
Engineering Geologist

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To Jeff England

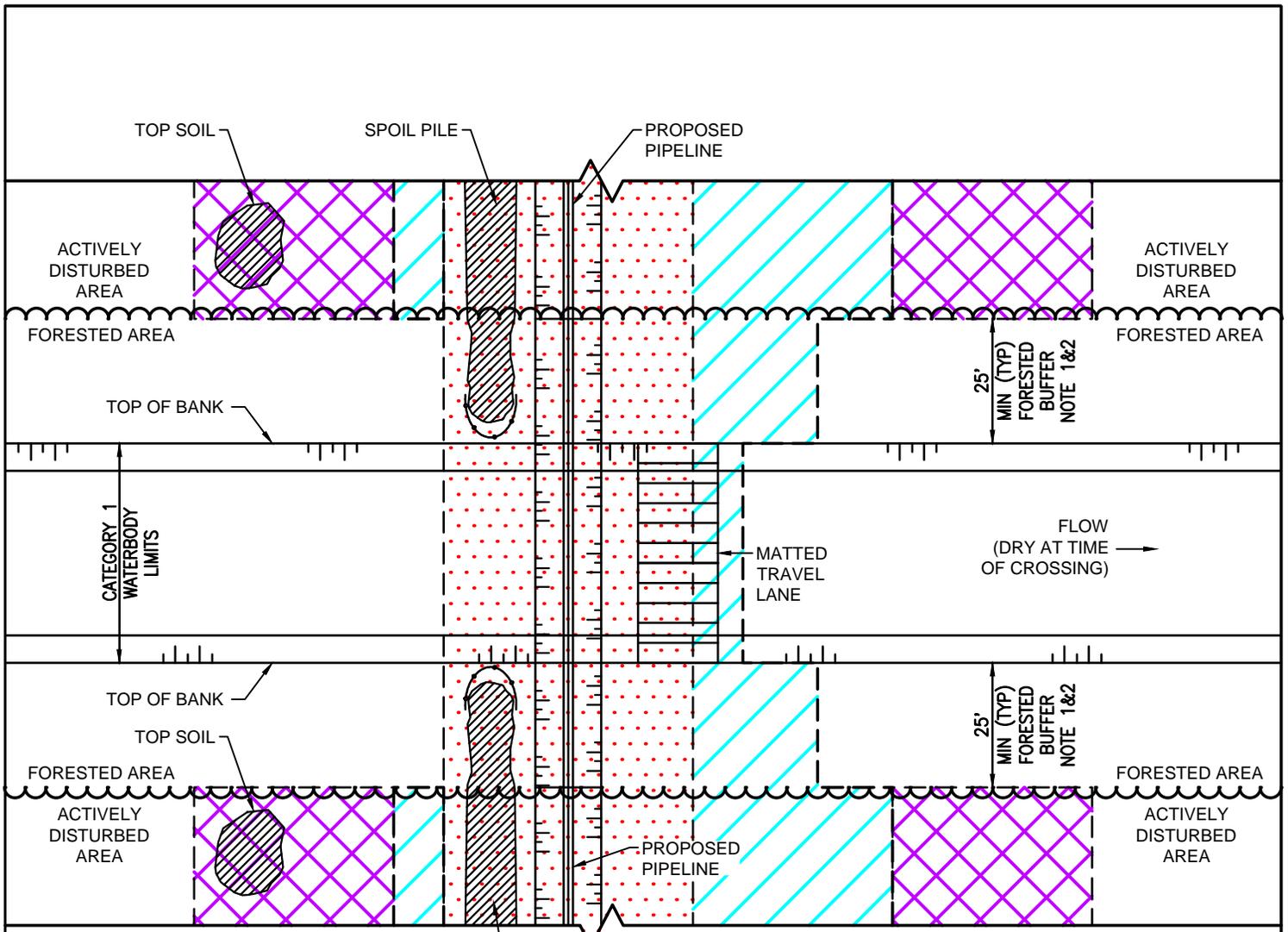
Date August 30, 2016

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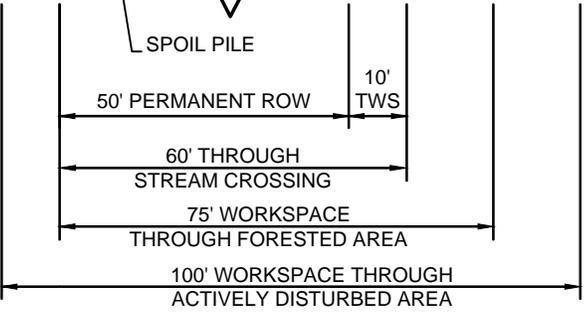
Attachment 2:

Workspace Configuration for C-1 Waterbody Crossings



LEGEND:

- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE (TWS)
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- FORESTED AREA LIMITS



PLAN VIEW

- NOTES:**
1. TEMPORARY WORKSPACE IS SET BACK 25' FROM TOP OF BANK OR AS SHOWN ON PLANS BASED ON PERMIT REQUIREMENTS.
 2. ATWS WILL BE LOCATED IN NON-FORESTED AND OR ACTIVELY DISTURBED AREAS WHERE PRACTICABLE.
 3. WORKSPACE WILL BE 75' WIDE THROUGH FORESTED RIPARIAN ZONE.
 4. DRY CROSSING INCLUDES BOTH DAM/PUMP AND FLUME PIPE METHODS. SEE FIGURES 1G AND 1H FOR ADDITIONAL NOTES.
 5. DIMENSIONS ON THIS FIGURE APPLY TO CATEGORY ONE DRY CROSSINGS ONLY.



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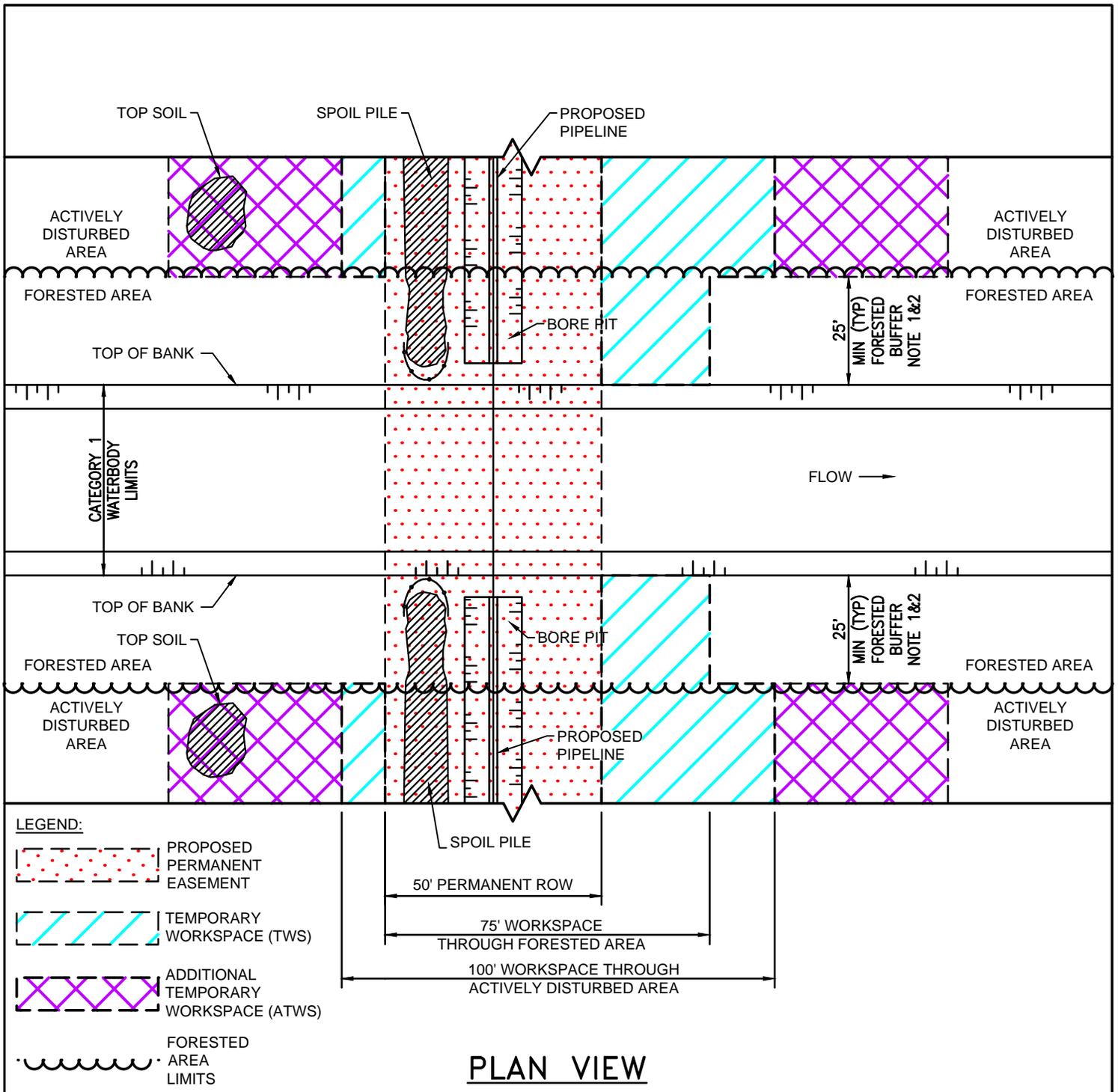
PennEast PIPELINE

PREPARED BY: Mott MacDonald

PENNEAST PIPELINE PROJECT

WORKSPACE CONFIGURATION FOR CATEGORY ONE WATERBODY DRY CROSSING TYPICAL

FIGURE NUMBER: **FIGURE 1M**



PLAN VIEW

NOTES:

1. TEMPORARY WORKSPACE IS SET BACK 25' FROM TOP OF BANK OR AS SHOWN ON PLANS BASED ON PERMIT REQUIREMENTS.
2. ATWS WILL BE LOCATED IN NON-FORESTED AND OR ACTIVELY DISTURBED AREAS WHERE PRACTICABLE.
3. WORKSPACE WILL BE 75' WIDE THROUGH FORESTED RIPARIAN ZONE.
4. CONSTRUCTION CONTRACTOR SHALL NOT CROSS WATERBODY WITH TIMBER MAT BRIDGE.

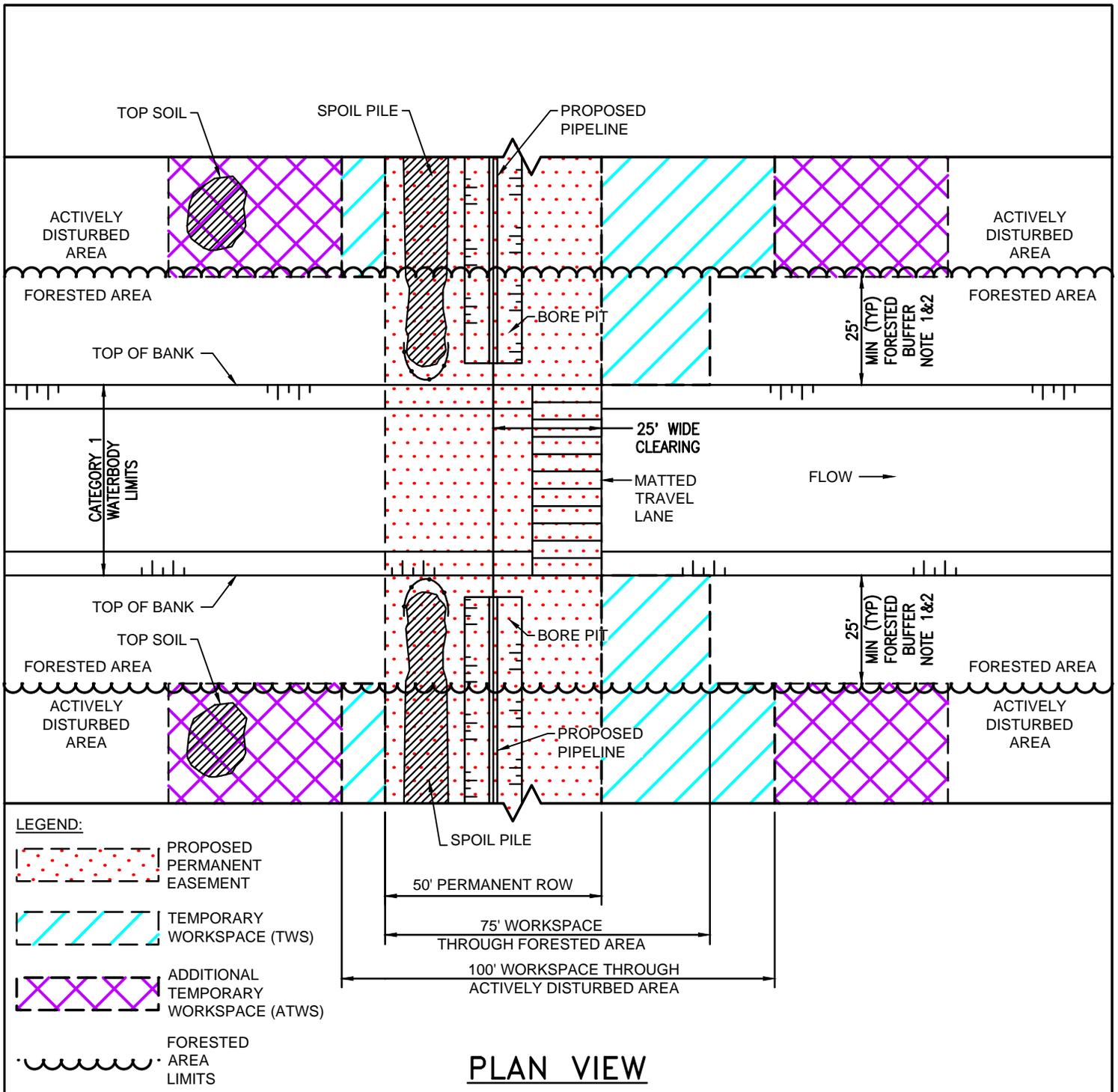


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 PREPARED BY: Mott MacDonald

PENNEAST PIPELINE PROJECT
WORKSPACE CONFIGURATION FOR
CATEGORY ONE WATERBODY BORED
CROSSING WITHOUT TIMBER MAT BRIDGE

FIGURE NUMBER: FIGURE 1N



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PennEast PIPELINE

PREPARED BY: Mott MacDonald

PENNEAST PIPELINE PROJECT

WORKSPACE CONFIGURATION FOR CATEGORY ONE WATERBODY BORED CROSSING WITH TIMBER MAT BRIDGE

FIGURE NUMBER: **FIGURE 1P**

Attachment 3:

NJDEP Trenchless Crossing Presentation



Trenchless Construction Methods

Glenn Duyvestyn, Ph.D., P.E., P.Eng.
Vice President

Trenchless Construction Methods



- Horizontal directional drilling
- Microtunnelling
- Direct Pipe
- Pipe Ramming
- Auger Boring



Horizontal Directional Drilling

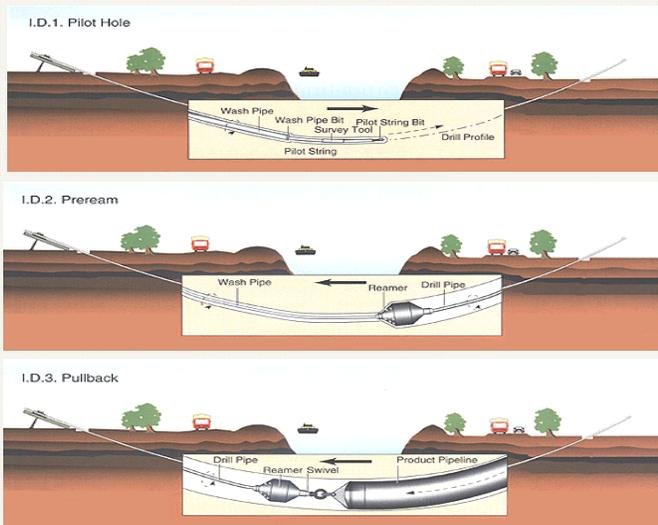


Three to four step installation process

- Pilot Bore
- Reaming Passes
- Swab Pass
- Product Pipe Installation



Horizontal Directional Drilling



Managing and Controlling Drilling Fluids

- Drilling fluids are lazy
- Follows path of least resistance
- Loss of drilling fluids
 - Formation losses
 - Fracturing losses
 - Increased risk with:
 - Shallow earth cover
 - Excessive mud weights
 - Improper bore cleaning
- Highest probability during pilot bore and initial reaming pass



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Managing and Controlling Drilling Fluids



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Drilling Fluid Returns



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Drilling Fluid Returns

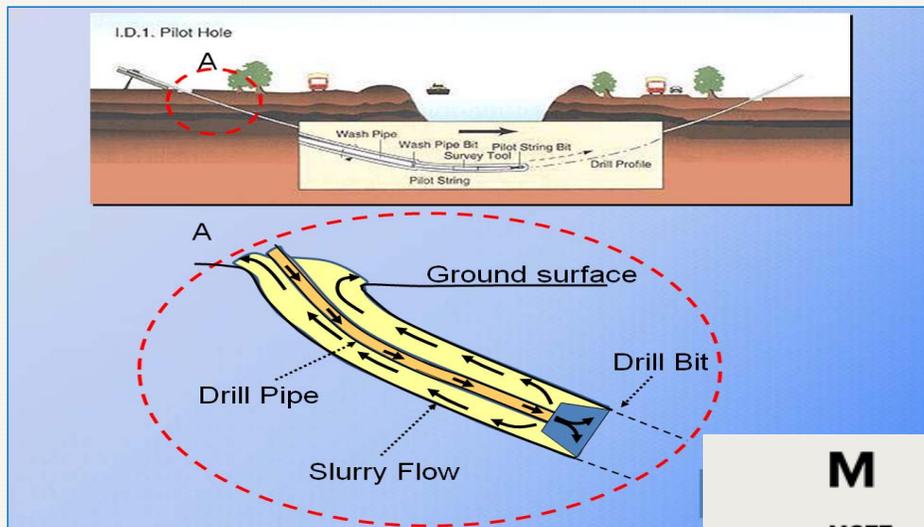


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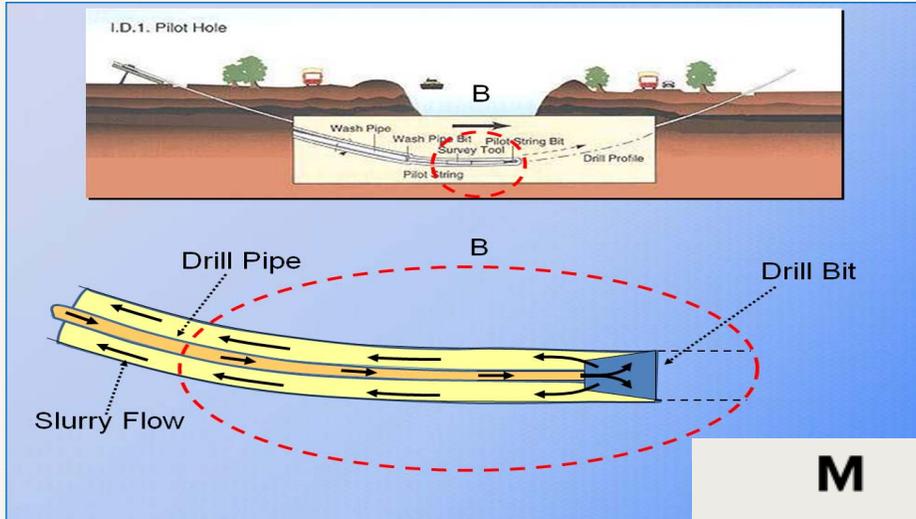
Drilling Fluid Returns



Managing and Controlling Drilling Fluids

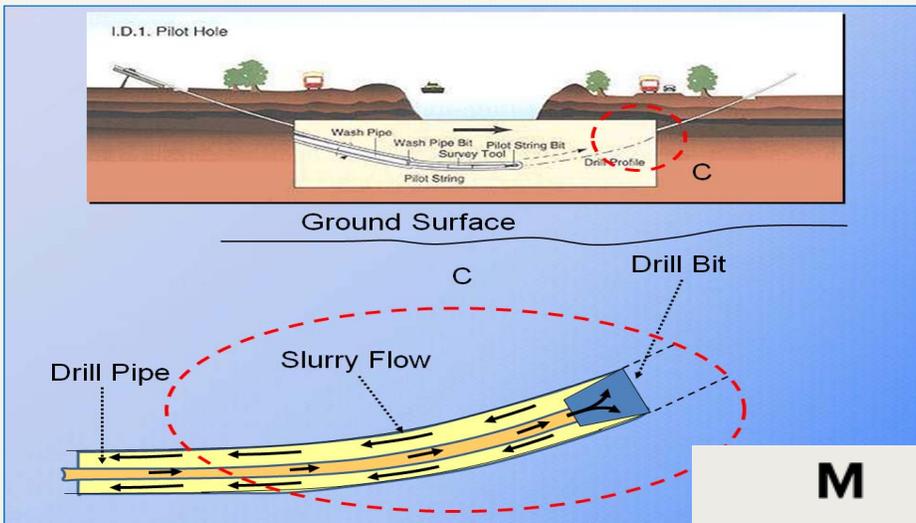


Managing and Controlling Drilling Fluids



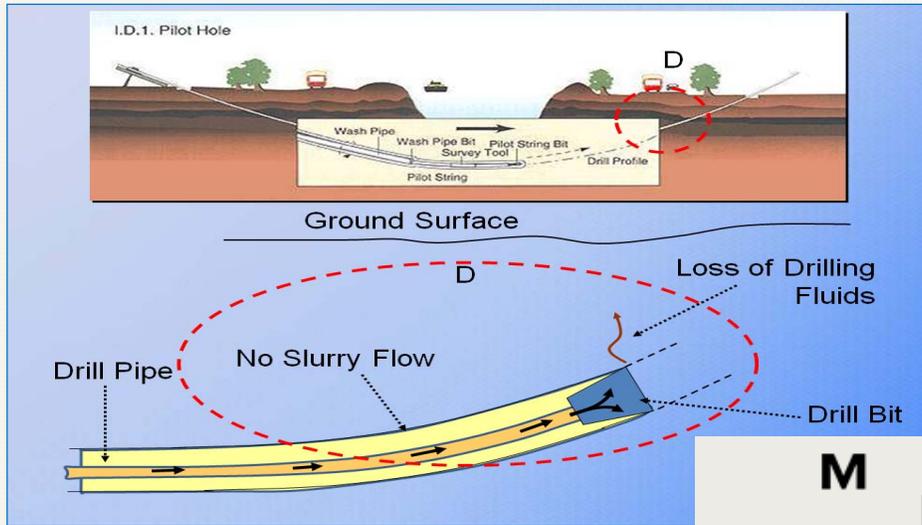
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Managing and Controlling Drilling Fluids



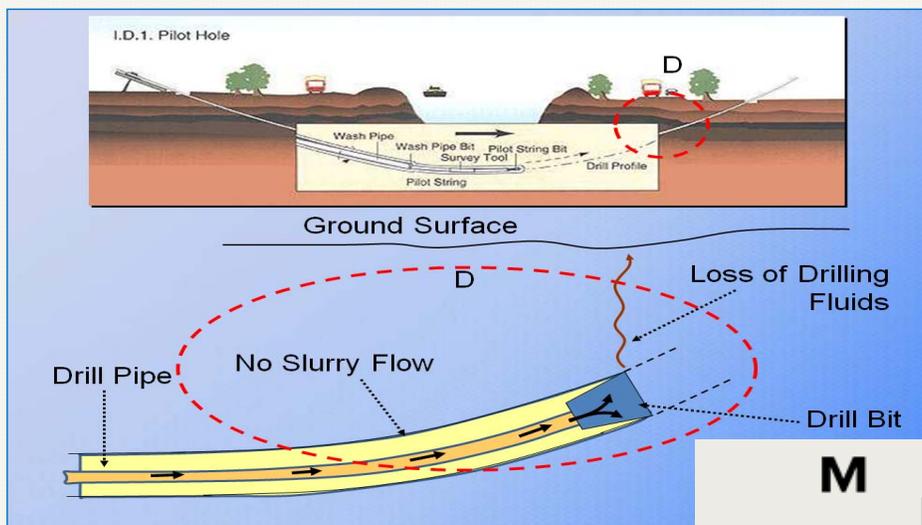
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Managing and Controlling Drilling Fluids



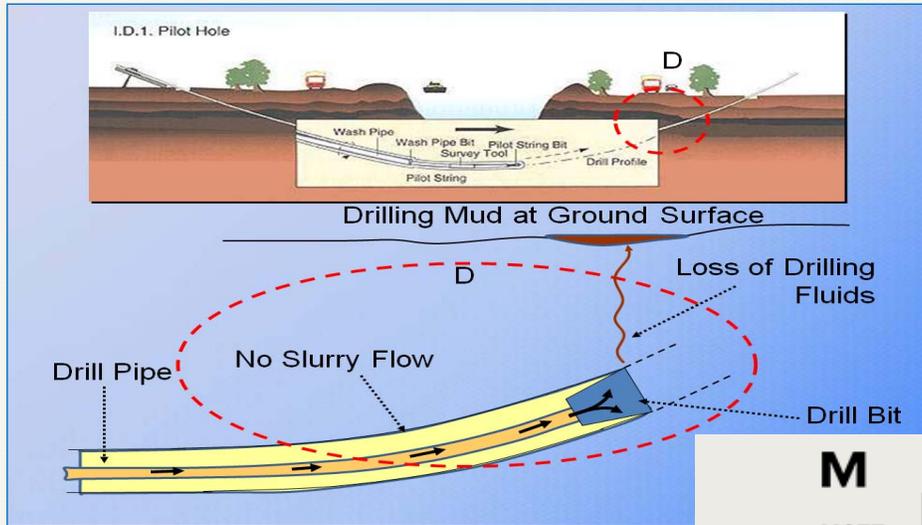
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Managing and Controlling Drilling Fluids

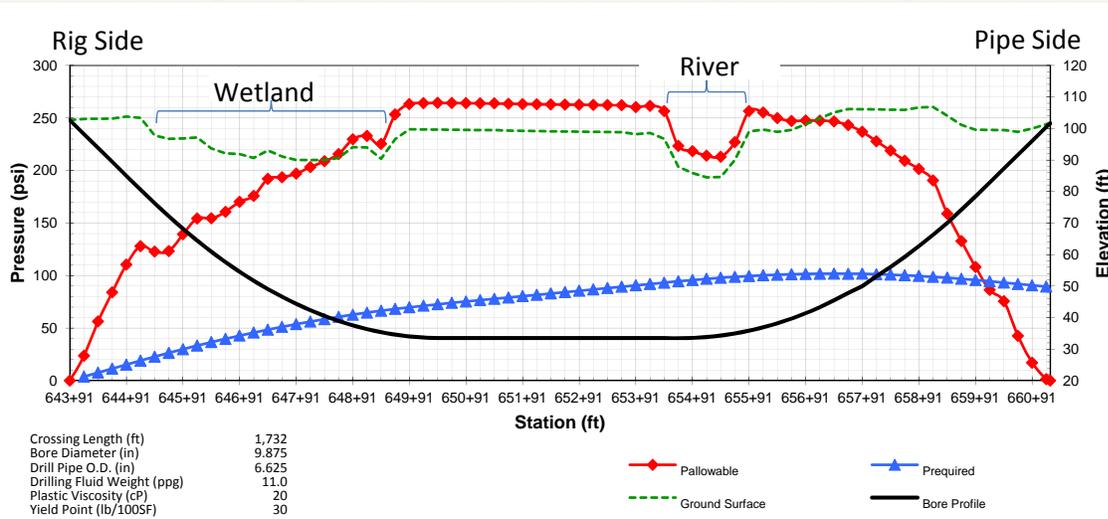


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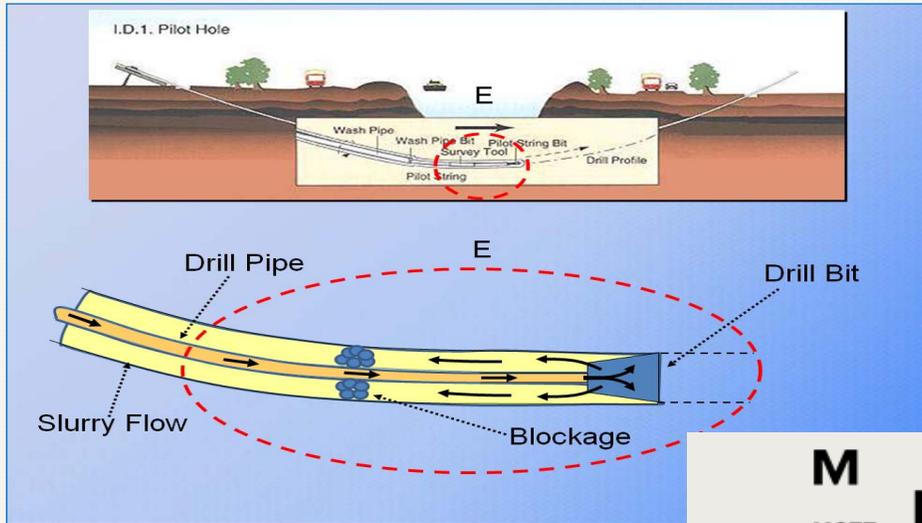


Managing and Controlling Drilling Fluids

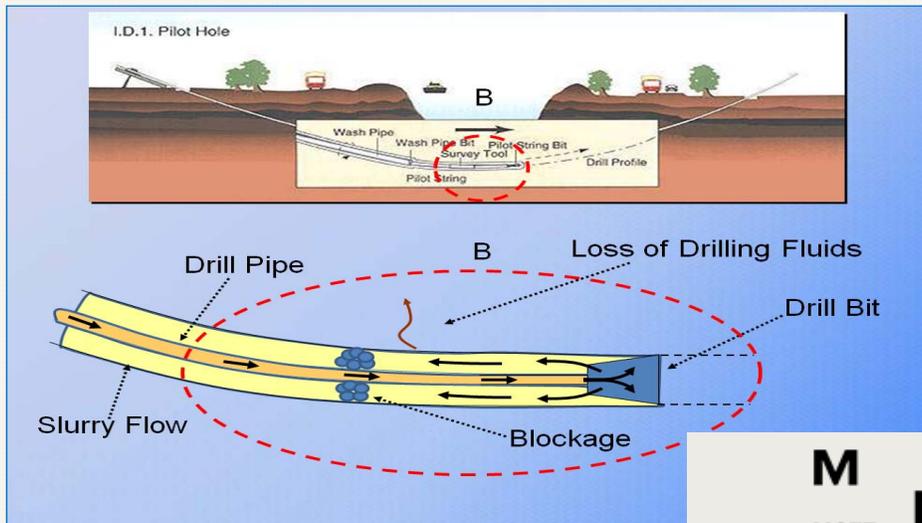


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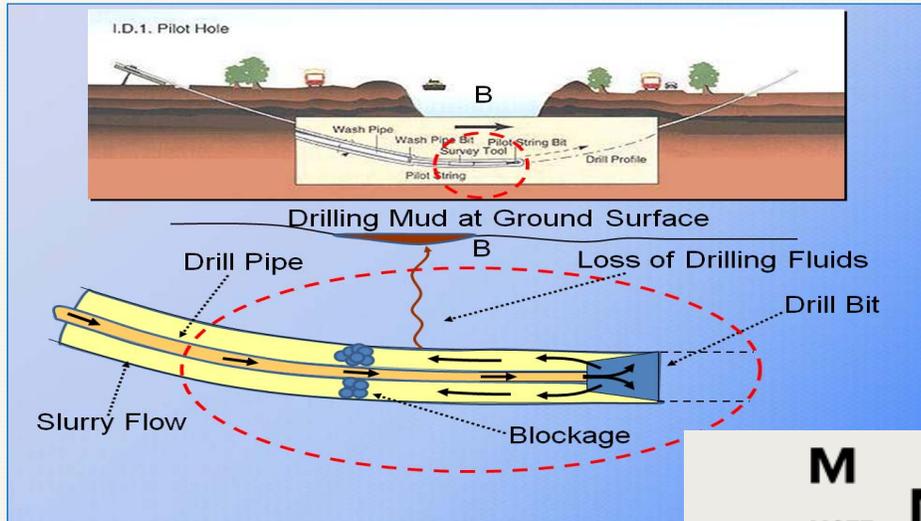
Managing and Controlling Drilling Fluids



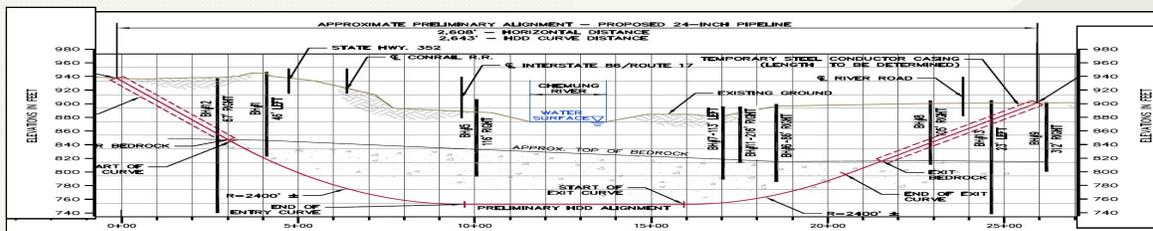
Managing and Controlling Drilling Fluids



Managing and Controlling Drilling Fluids



Drill and Intersect Method



Drill and Intersect Method Advantages



- Allows for installation of conductor casing on each end of the HDD installation
- Significantly reduced drilling fluid pressures
- May reduce installation risks

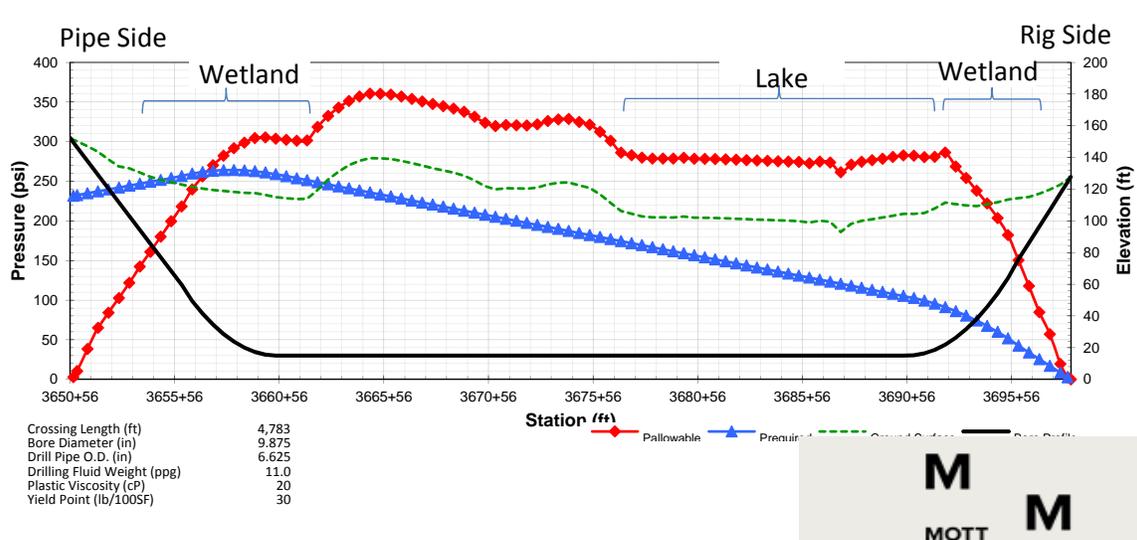


Drill and Intersect Method Additional Requirements

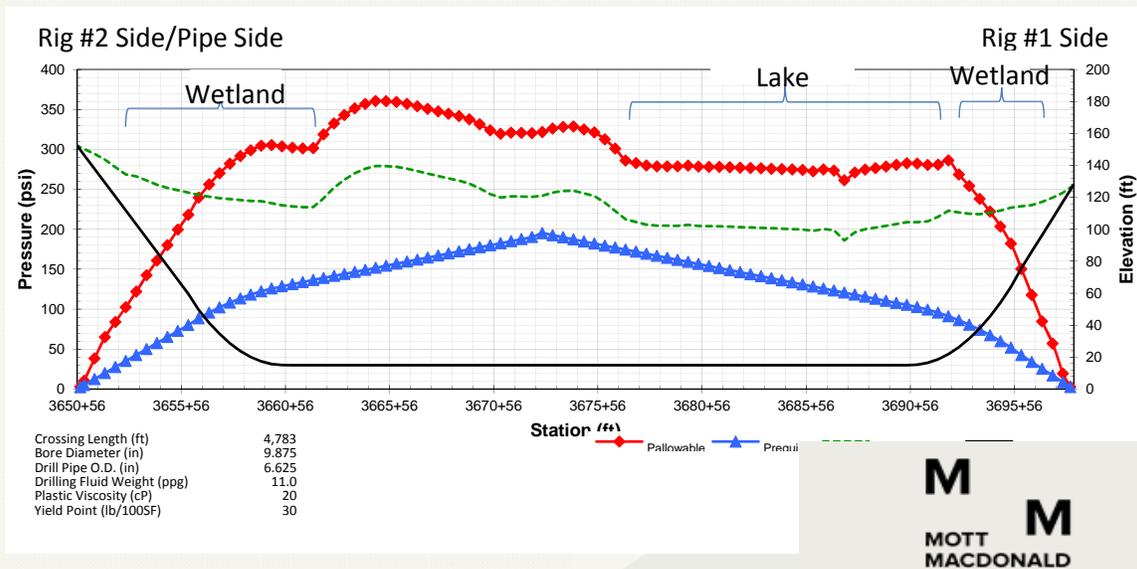
- Water demands at both ends of the alignment
- Large staging areas on both ends of alignment
- Risk of sharp bends at intersection
- Requires experienced contractor and personnel



Drill and Intersect Risk Reduction



Drill and Intersect Risk Reduction



Geotechnical Risks

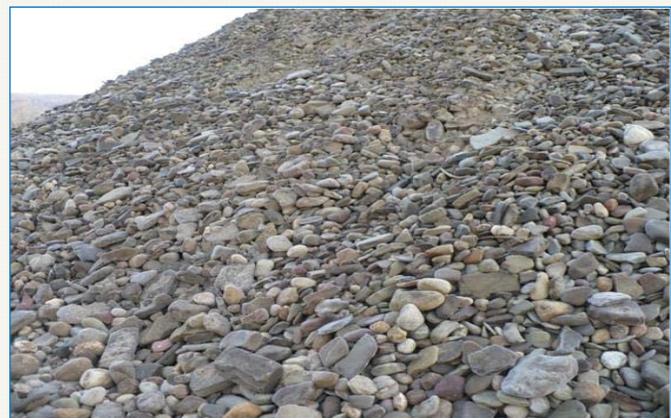
- Sands & silts:
 - Typically no concerns
 - Very loose soils
- Clays:
 - High plasticity “sticky” clay can be problematic
 - Soft clays
- Gravels, cobbles and boulders
 - Particles > ¾-inch accumulate in bottom of bore
 - Steering response may be poor, impacting alignment
 - Excessive drilling fluid losses
 - Tendency for over-mining, excessive settle and sinkholes



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Geotechnical Based Installation Risks

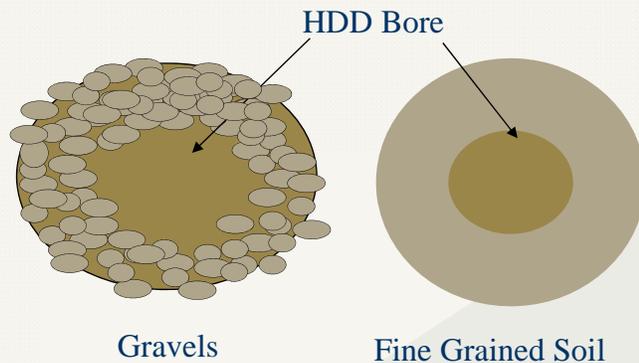
- Soil conditions
 - Density/consistency
 - Gravel and cobble compositions
 - Bore stability / Raveling
 - Drilling fluid management
 - Swelling tendencies
- Bedrock conditions
 - Rock quality designation
 - Joints / fractures
 - Strength



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Geotechnical Risks - Gravels and Cobbles

- Bore collapse
- Poor steering control
- Loss of drilling fluid
- Unable to transport cuttings from bore



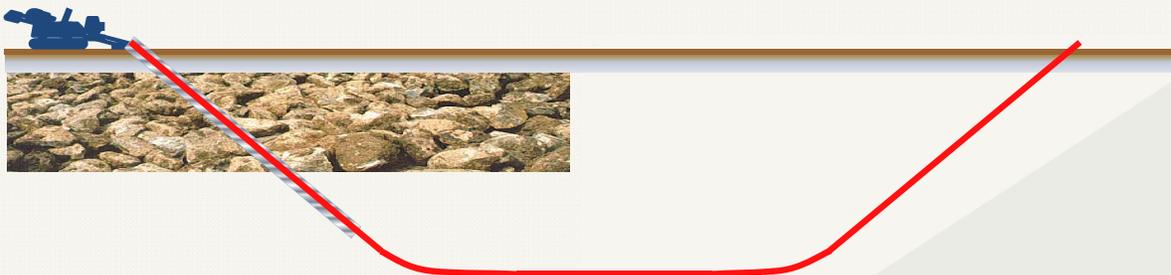
Mitigate risks by:

- Locating installation in favorable soils
- Use of starter casing(s)
- Different construction method



Geotechnical Risks - Gravels and Cobbles

- Starter / Conductor casing



Geotechnical Risks - Gravels and Cobbles

- Starter / Conductor casing



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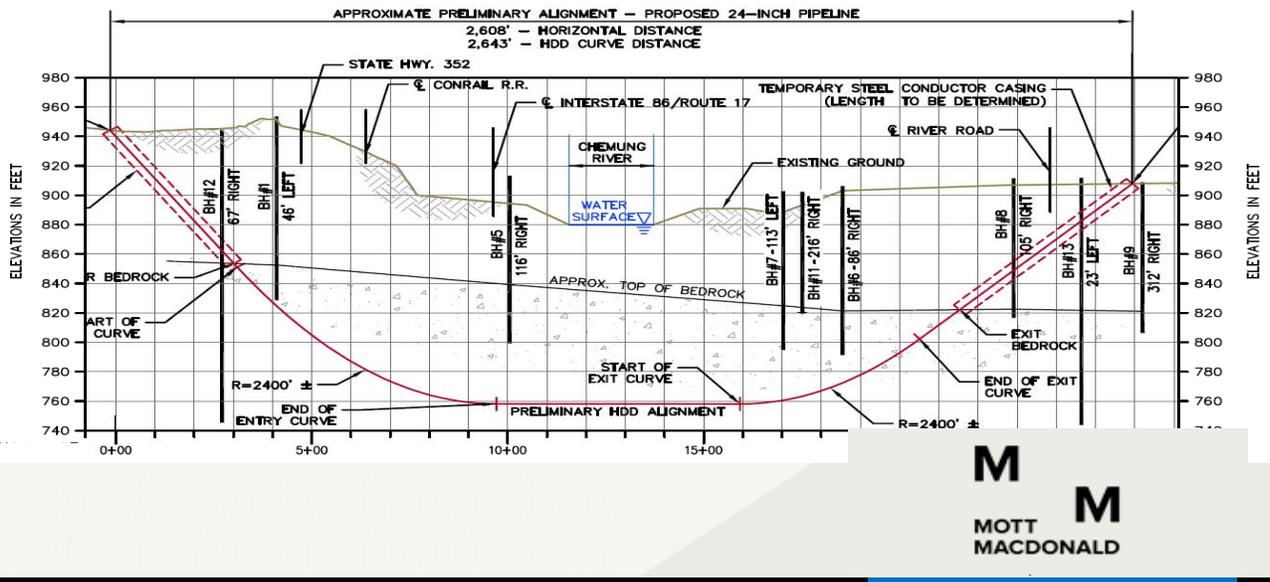
Geotechnical Risks - Gravels and Cobbles

- Starter / Conductor casing



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Chemung River Crossing



Boulders



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Pipe and Coating Damage Cobbles/Boulders/Fractured Bedrock



Geotechnical Risks

- **Very soft soils**
 - Poor steering control
 - Risk of over-bending the pipe
 - Drilling outside of easement
 - Low bearing capacity
 - Thrust block concerns
 - Increased risk of fluids loss and hydraulic fracturing
 - Less soil strength to resist drilling fluid pressures



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Geotechnical Risks

Rock

- Weathered, jointed, and/or fractured bedrock:
 - Increased fluid losses
 - Inability to maintain bore stability
 - Steering difficulties
- High unconfined compressive strength (>25,000 psi):
 - Decreased productivity
 - Steering limitations
- Magnetic rock



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Geotechnical Risks – Fractured Bedrock

- Inadvertent returns



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Bending Radius Issues Increased Stresses on Tooling

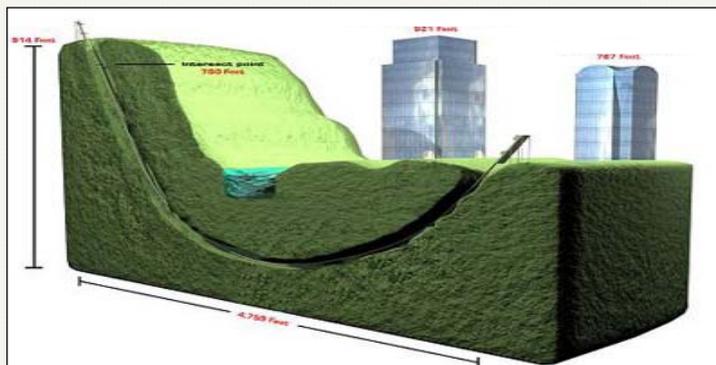
- Steering issues – curve radius issues



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Topography Risks High Elevation Differences

- Elevation differential
 - Entry vs. exit
 - Drilling strategy
 - Bore instability
- Drilling fluid management
- Dry bore in sands
 - Key-holing of drill pipe



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Typical HDD Drill Site Operation



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Typical HDD Drill Site Operation



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Typical HDD Pullback Operation



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Typical HDD Pullback Operation



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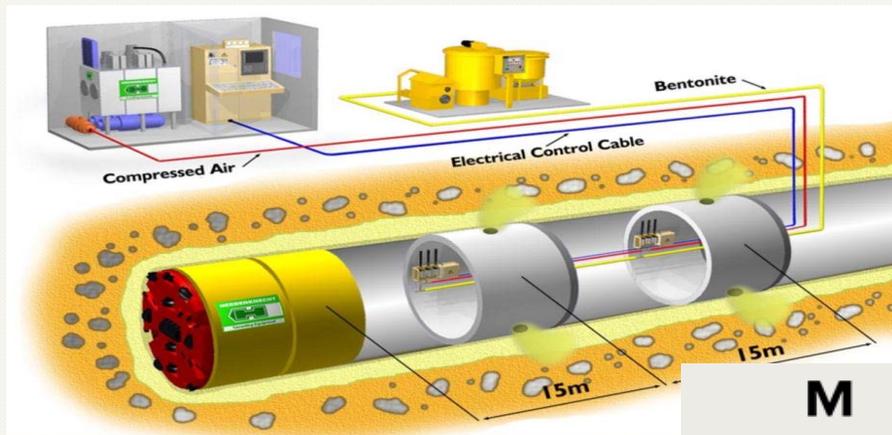
Microtunnelling



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Bentonite Lubrication

Small Overcut: 0.5 to 0.75 inches (12 to 19 mm) on the radius



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Cutter Head Configurations



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Machine Launch / Jacking Shaft



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Machine Retrieval



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Microtunnel One Pass versus Two Pass

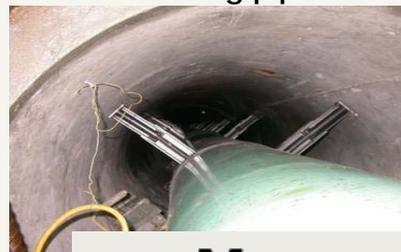
One Pass Installation

- Jacking pipe serves as the carrier pipe to convey flows



Two Pass Installation

- Jacking pipe serves as a casing pipe
- Carrier pipe installed within casing pipe



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Application to Energy Pipelines

- To date, microtunneling has seen very limited application to energy pipelines
 - Two pass system required
 - Holes in pipe for lubrication
 - Fabrication of pipe string / shafts



Geotechnical Risks - Soils

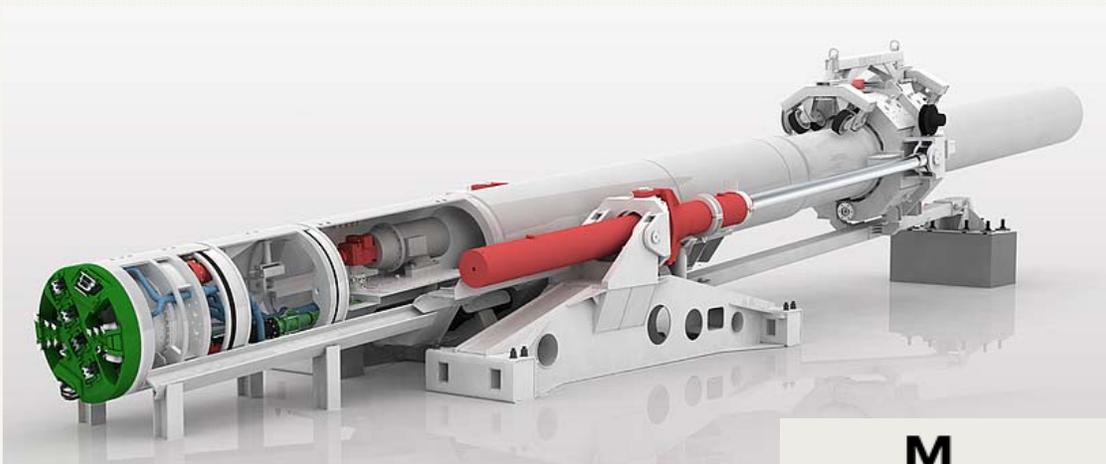
- Sands, silts and clay:
 - Typically no concerns
 - Very loose or soft soils
 - Bearing capacity issues
 - Machine may sink / steering difficulties
- Clays:
 - High plasticity “sticky” clay can be problematic
- Gravels, cobbles and boulders
 - Stalling out of machine
 - Tendency for over-mining, excessive settlements and sinkholes
 - Excessive abrasion wear on machine
- Wood

Geotechnical Risks - Bedrock

- Weathered, jointed, and/or fractured bedrock:
 - Steering difficulties
 - Excess wear
- High unconfined compressive strength (25,000 psi):
 - Limited application
 - Excess wear
 - Cutter replacements



Direct Pipe



Direct Pipe



Thruster Clamping Device

Gripper pads

- Circumferential grippers
- Clamp inserts matched to gas pipeline diameter

Grip demonstration tests

- Full grip pressure
- Full forward thrust

No coating damage observed



Shallow Launch Thrust Block and Frame Setup

- Designed for horizontal and vertical loading
Forces depend on entry angle and thrust force



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Microtunnel Machine Staging



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Pipe Thruster



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Bentonite Lubrication Plant: Connected to Seal

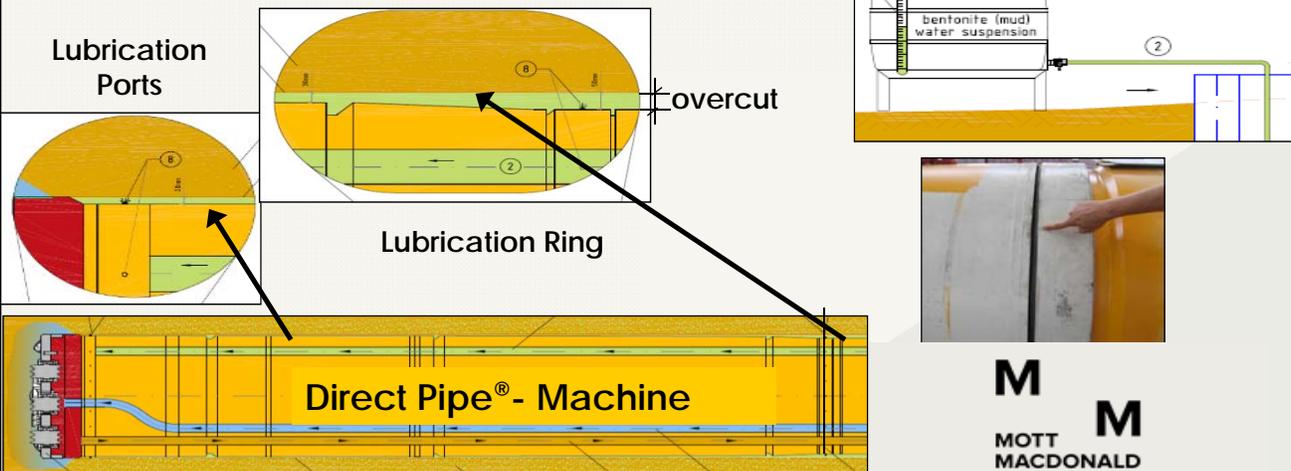


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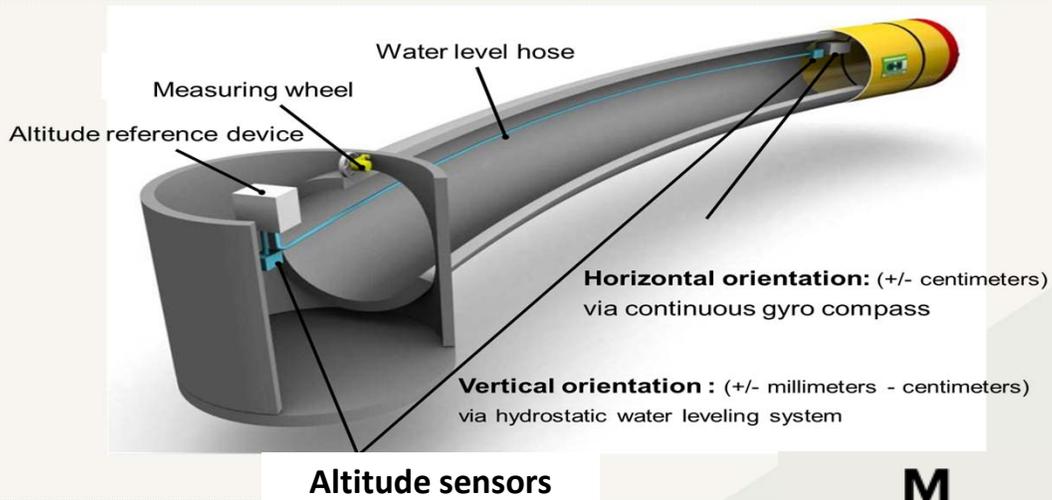
Bentonite Lubrication System

Separate lubrication supply lines
Overcut 2 - 6 inches on radius

Launch Seal / Overcut Injection



Navigation/Guidance System



Geotechnical Risks

- Similar to microtunneling
- Removal of machine
 - Collapse of ground
- Abrasive ground
 - Excessive damage to coatings



Conductor Casing Installation



Potential Excessive Wear



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Auger Boring (Jack and Bore)



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Small Boring Unit – Bedrock Installations



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Auger Boring (River Crossing)



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In Good Water-tight Ground...



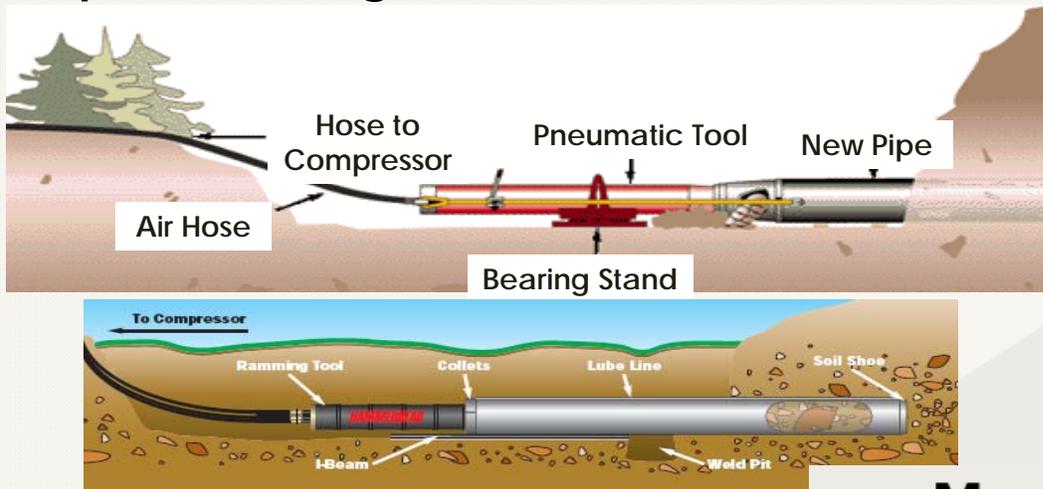
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Geotechnical Risks

- Fill materials
- Gravels, cobbles and boulders
 - Passage through auger flights
- Bedrock
 - Excessive wear on cutters
- Groundwater
 - Dewatering of pits required
 - Dewatering along alignment (?)
 - Dewatering of watercourse (?)

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Pipe Ramming



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Geotechnical Risks

- Fill materials
- Hard / dense ground
- Boulders
 - Passage into casing pipe
- Bedrock
 - Advancement not possible
- Groundwater
 - Dewatering of pits required
 - Dewatering along alignment (?)
 - Dewatering of watercourse (?)

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Summary

- Not all trenchless methods are the same
- Limitations of each construction method must be fully understood
- Need to understand risks associated with each specific crossing



Questions?



Glenn Duyvestyn, Ph.D., P.E., P.Eng
glenn.duyvestyn@mottmac.com
216.978.2435



Attachment 4:

USFWS Correspondence on Bat Hibernacula



AECOM
625 West Ridge Pike, E-100
Conshohocken, PA 19428
Telephone: (610) 832-3500
Facsimile: (610) 832--3501

MEMORANDUM

To: File (Job # 60414094)
From: Deborah Poppel
Date: May 10, 2016
Re: PennEast Pipeline Project- Telephone Conversation with Pamela Shellenberger, USFWS-PA

On May 10, 2016, Pam Shellenberger called me to check on the status of what USFWS owed us in terms of correspondence regarding the PennEast Pipeline Project and for an update on species surveys.

I returned her call and let her know that we were still waiting for USFWS' response letter regarding the survey reports that had been submitted in October 2015 for Northeastern bulrush, Indiana/northern long-eared bat, and bog turtle. I also mentioned that we had wanted to discuss further the potential impact avoidance measures that PennEast could use at the known bog turtle wetland in the vicinity of MP 49.

A summary of issues discussed follows- 1) With reference to the known hibernacula locations that were provided by USFWS. The underground mine/cave extent needs to be mapped/delineated (check existing data resources)- USFWS needs to know if/where does the pipeline cross? Vibration is a concern. 0.25 mile buffer does not just apply to the opening of the cave. (from RR3: Cave 1 and Cave 2 entrances are both located in the vicinity of MP 77.25, 1,125 feet south of the proposed pipeline. Tunnel 34 entrance is located in the vicinity of MP 11.3, 1200 feet southwest of an access road and 6,100 feet west of the proposed pipeline.)

2) USFWS was asked- what about Phase 2 and Phase 3 surveys going on at wetlands where not all of the wetland is accessible? Pam wanted to know if the pipeline LOD was accessible and if the non-accessible portions were "off" ROW. Deb will continue to coordinate with bog turtle surveyors and have them provide information regarding where non-access is issue.

3) There is a known bog turtle wetland at MP 49. Deb asked if HDD or direct push technology could be used to avoid impacts. Pam needs to know, for HDD- will drilling fluid be used? What is depth of drill? What is geology (is it feasible without frack-outs?) What is size of entry/exit pits? Will monitors be on site (not just for turtles but for checking for sediment/springs)

4) USFWS will be issuing one letter for all federal RTE species. Need to know the additional information that was requested for #1 and #3, and also the conclusion of this spring's Bog Turtle surveys, before they can issue a determination of effect for the Project.



AECOM
625 West Ridge Pike, E-100
Conshohocken, PA 19428
Telephone: (610) 832-3500
Facsimile: (610) 832--3501

MEMORANDUM

To: File (Job # 60414094)
From: Deborah Poppel
Date: August 15, 2016
Re: PennEast Pipeline Project- Telephone Conversation with Pamela Shellenberger, USFWS-PA

The following provides a summary of the discussion with Pam Shellenberger of USFWS (PA) on August 15; Ryan Leiberher, QIBS from AECOM Harrisburg was also a participant in the call.

We provided Pam with the screenshots of the cave locations vs workspace, as well as PADEP GIS data displaying underground mine extent for discussion purposes. We noted that we were asking USFWS for input on the status of their impact review for bats and to discuss avoidance and minimization measures related to the known hibernacula, prompted by the issuance of the DEIS. She noted that USFWS was still in data gathering mode and that we have now provided some of the additional information requested.

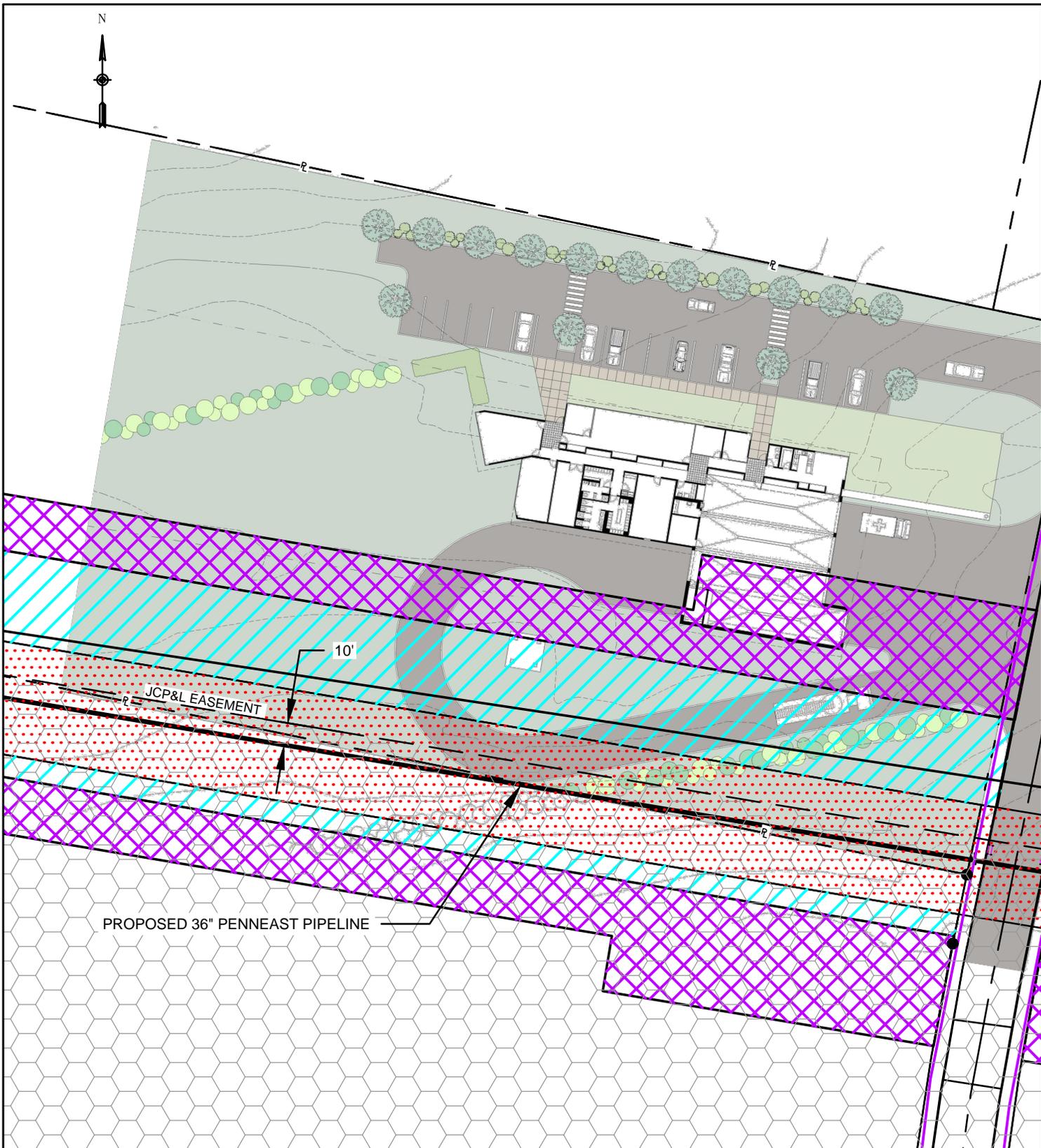
As for Tunnel 34, she concurred that it appears the work area is outside of the 0.25 mile buffer and also that it does not appear there are any underground mines or caves that could affect bats based on the database information. However, she (USFWS) is going to contact PGC to find out if there is any additional information regarding this hibernaculum and its underground extent. She noted that as for tree clearing, there should be no impacts anticipated here and the project would be in compliance with the 4d rule. The USFWS can be expected to request a season restriction on drilling, boring, or blasting in this vicinity, whereby such activities would need to take place outside of the hibernation season. They will likely also request vibration monitoring and temperature/humidity monitoring pre-, concurrent, and post-construction to get an assessment of underground impacts.

For the Durham Caves, the USFWS is assuming presence and is not considering outside factors such as white-nose syndrome. As above, tree clearing here (as the work is within an ag field) is not expected to be an impact and is in compliance with the 4d rule. USFWS concurs that existing farming activities may cause certain levels of vibration within the caves, and thus will likely request monitoring as noted above (to get an assessment of existing levels), and has also requested that we provide any information that PennEast may have on seismology studies in the area. USFWS would also like to contact the property owner to try to see if they have any information (maps, etc) about the caves and asked that we provide them with a phone number. As with Tunnel 34, in order to issue a no-adverse affect finding, USFWS will request that activities such as blasting, drilling, or boring take place outside of the winter hibernating season.

Attachment 5:

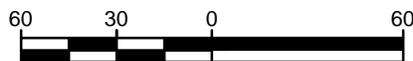
Hopewell Township Emergency Services Facility Location Drawing

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NOTE:
 IMAGERY FOR DEVELOPMENT PLANS HAS BEEN
 MANUALLY GEO-REFERENCED BASED ON
 AVAILABLE DATA AND IS FOR INFORMATIONAL
 PURPOSES ONLY.

SCALE: 1" = 60'



LEGEND

	PROPOSED PIPELINE		ACCESS ROAD
	PROPOSED PERMANENT EASEMENT		PROPERTY LINE
	TEMPORARY WORKSPACE		EXISTING JCP&L EASEMENT
	ADDITIONAL TEMPORARY WORKSPACE		

PREPARED FOR: PENNEAST



PREPARED BY: MOTT MACDONALD

PENNEAST PIPELINE PROJECT

PROPOSED 36" PENNEAST PIPELINE
 HOPEWELL EMERGENCY SERVICES FACILITY
 MERCER COUNTY, NEW JERSEY

FIGURE NUMBER:

Attachment 6:

Recreation and Special Use Crossing Map Book

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<ul style="list-style-type: none"> — PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) — PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA — ACCESS ROAD — INTERSTATE — HIGHWAY — RAILROAD 	<ul style="list-style-type: none"> RECREATION OR SPECIAL USE PROPERTY BOUNDARY COUNTY BOUNDARY STATE BOUNDARY WATERBODY CITY AREA PARKS
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PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS



ABSOLUTE SCALE: 1:633,600
REFERENCE SCALE: 1 IN = 10 MILES

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PAGE:	INDEX

Page No.	Recreation/Special Interest Area	Approximate MP		Parcel Numbers	Landowner/Land Manager
1	Frances Slocum State Park	2.1	2.4	PE-LU-024.000	Pennsylvania Department of Natural Resources (PADCNR)
2	Pinchot State Forest	11.5R 12.1	11.7R 12.7	PE-LU-188.000 PE-LU-192.000	PADCNR
3 - 7	State Game Land 91	15.7 AR-031 21.5 AR-033	18.6 - 23.0 -	PE-LU-208.000 PE-LU-227.000 PE-LU-A605.001	Pennsylvania Game Commission (PGC)
8	Francis E. Walter Dam	23.0	23.1	PE-LU-228.000 PE-CA-001.000	US Army Corps of Engineers (USACE)
9	State Game Land 40	24.9 AR-034	25.8	PE-CA-006.000	PGC
10 - 13	Hickory Run State Park	29.1 30.3 30.4 32.7 34.7	29.9 30.4 31.4 34.5 34.7	PE-CA-015.000 PE-CA-017.000 PE-CA-018.000 PE-CA-046.000	PADCNR
14	Weiser State Forest	36.4 AR-041	37.1 -	PE-CA-115.000	PADCNR
15	State Game Land 129	29.9	30.3	PE-CA-016.000	PGC
16	Beltzville State Park	43.1	44.1	PE-CA-149.000 PE-CA-152.000 PE-CA-151.000 PE-CA-154.000	USACE/PADCNR
17 - 18	Blue Mountain Ski Area	49.1 AR-051	51.1 -	PE-CA-A651.000 PE-CA-187.015 PE-CA-187.016 PE-CA-187.017 PE-CA-187.018 PE-CA-187.019 PE-CA-187.020 PE-CA-187.021 PE-CA-187.022 PE-CA-187.024	Private Landowner

Page No.	Recreation/Special Interest Area	Approximate MP		Parcel Numbers	Landowner/Land Manager
19 - 20	State Game Land 168	50.8 51.0 52.8 53.1 53.5	50.9 52.8 52.9 53.3 53.6	PE-NO-001.034 PE-NO-001.041 PE-NO-001.002	PGC
21	Calvary Baptist Church	67.9 AR-066	68.0 -	PE-NO-169.000	Private Landowner
22	Palmer Bethlehem Bikeway, D&L Trail Lehigh Canal, and Adjacent Municipal Land	70.4 AR-071 70.9	70.4 - 71.1	PE-NO-205.000 PE-NO-208.000 PE-NO-210.000 PE-NO-211.000	Bethlehem Township, Pennsylvania Commonwealth, Easton City
23	Delaware Canal State Park	77.6	77.7	PE-BU-012.000 PE-BU-013.000	Pennsylvania Fish and Boat Commission/PADCNR
24	Gravel Hill Preserve	81.4 AR-083	81.8 -	PE-HU-046.000 PE-HU-A063.000	State of New Jersey – Department of Environmental Protection (NJDEP)
25 - 26	Ted F. Stiles Preserve at Baldpate Mountain and Affected Mercer County Parcels	105.4R AR-101	107.8R -	PE-ME-013.000 PE-ME-016.000 PE-ME-018.001 PE-ME-020.000 PE-ME-022.000	County of Mercer, NJDEP
27	Jacob's Creek Trail	109.0R AR-103B	109.7R -	PE-ME-029.000	Private Landowner
28	Woolsey Park	110.0R	110.8	PE-ME-035.000 PE-ME-037.000	Township of Hopewell

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

NOTES INDEX



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PAGE:	NOTES INDEX

GENERAL NOTES

- 1 PennEast will adhere to Project construction specifications and applicable FERC, USACE, PADEP and/or NJDEP regulatory requirements, including those pertaining to safety; environmental inspection; spill prevention, control, and cleanup; and erosion/sediment control in both upland and wetland areas. Environmental training will be required for all land agents, construction personnel and environmental inspectors; agency personnel will also be invited to the training.
- 2 PennEast will schedule a pre-construction conference with the landowner and/or land manager to review the terms and conditions of the easement across the affected property(ies), identify sensitive resources in the field (e.g., wetlands, watercourses, survey markers, trails), and confirm the site-specific construction procedures to be used to minimize potential adverse effects to such resources.
- 3 PennEast will provide the land-owner and/or land-manager with Project Safety and Environmental Awareness Training (which will be required for all personnel entering Project construction work areas), as well as relevant contact information for PennEast and contractor representatives involved in work activities on the affected recreational or special use property(ies).
- 4 PennEast's environmental and construction inspectors as well as ROW Land Agents will be on-site during construction and will be the primary points of contact with the landowner and/or land manager
- 5 Construction areas will be inspected and maintained in a sanitary condition at all times; waste materials (including but not limited to human waste, trash, garbage, refuse, and oil and petroleum products) will be disposed of promptly at an approved waste disposal site.
- 6 Construction materials and construction equipment in the vicinity of public recreational areas will be moved outside of sensitive resource areas in accordance with FERC Plans and Procedures, and appropriately secured prior to cessation of work at the end of each work day.
- 7 As applicable, timing restrictions, proposed closure details, and site-specific safety and mitigation measures will be determined through the licensing process, documented in the Environmental Permit Notebook.

TRAIL CROSSING NOTES

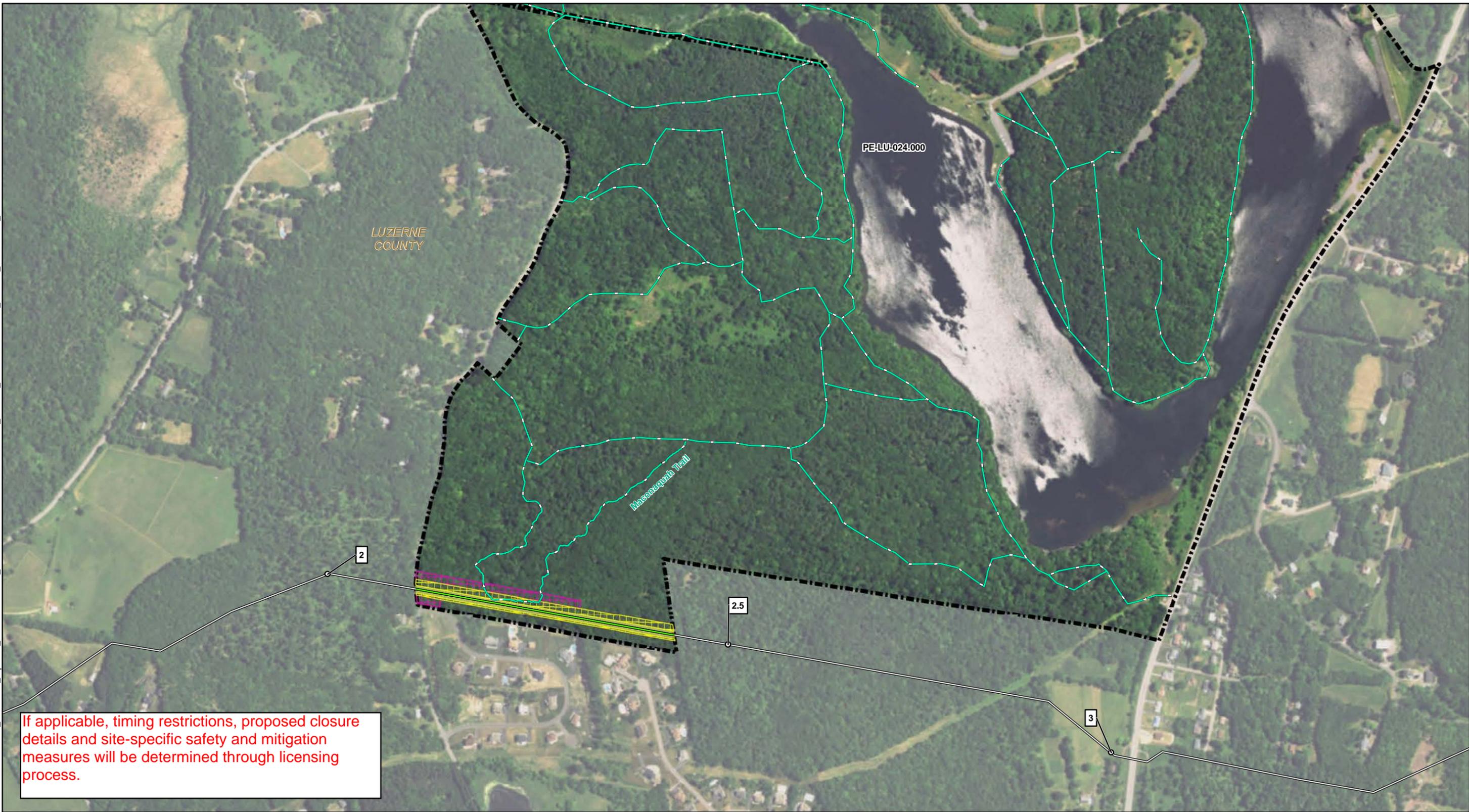
- 8 Appropriate barriers to mitigate noise and/or visual impacts, safety fencing, and/or signs will be installed at or along trail crossings, as appropriate, prior to the initiation of construction. These measures will protect hikers, minimize impacts on trail use and enjoyment, and allow safe passage across or around the construction work area. Safety measures will be maintained throughout the construction process. During clearing and other construction activities, PennEast's construction contractor will post personnel along the trail(s) at appropriate distances from the construction work area to inform hikers of the construction and to regulate pedestrian traffic along the trail(s) to avoid potential conflicts with construction work.

PENNEAST PIPELINE PROJECT
RECREATION AND SPECIAL USE AREAS

GENERAL NOTES



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If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.

MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION OR SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

FRANCES SLOCUM STATE PARK
LUZERNE COUNTY, PENNSYLVANIA



ABSOLUTE SCALE:
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REFERENCE SCALE:
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LUZERNE COUNTY

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- ACCESS ROAD
- TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT
- RECREATION OR SPECIAL USE PROPERTY BOUNDARY
- PENNEAST PERMANENT EASEMENT
- ACCESS ROAD WORKSPACE/ WAREYARD
- PENNEAST TEMPORARY WORKSPACE
- PENNEAST ADDITIONAL TEMPORARY WORKSPACE
- COUNTY BOUNDARY
- STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

PINCHOT STATE FOREST

LUZERNE COUNTY, PENNSYLVANIA



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SEE PAGE 4

AR-031

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LUZERNE COUNTY

PE-LU-208.000

SEE PAGE 5

1. Mitigation for Ruffed Grouse Society seeded habitat that is located across from the Project's proposed access road will be determined through the licensing process. (PE-LU-227.000, PE-LU-A605.001)

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- STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

STATE GAME LAND 91
LUZERNE COUNTY, PENNSYLVANIA



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SEE PAGE 3

AR-031

PE-LU-208.000

PE-LU-208.000

LUZERNE COUNTY

SEE PAGE 5

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-  ACCESS ROAD
-  TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT
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-  PENNEAST TEMPORARY WORKSPACE
-  PENNEAST ADDITIONAL TEMPORARY WORKSPACE
-  COUNTY BOUNDARY
-  STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

STATE GAME LAND 91

LUZERNE COUNTY, PENNSYLVANIA



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SEE PAGE 3

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MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

STATE GAME LAND 91

LUZERNE COUNTY, PENNSYLVANIA



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SEE PAGE 7

PE-LU-A605.001

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CARBON COUNTY

LUZERNE COUNTY

PE-LU-227.000

1. Mitigation for Ruffed Grouse Society seeded habitat that is located across from the Project's proposed access road will be determined through the licensing process. (PE-LU-227.000, PE-LU-A605.001)

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MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

STATE GAME LAND 91
LUZERNE COUNTY, PENNSYLVANIA



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SEE PAGE 6

PE-LU-A605.001

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LUZERNE COUNTY

1. Mitigation for Ruffed Grouse Society seeded habitat that is located across from the Project's proposed access road will be determined through the licensing process. (PE-LU-227.000, PE-LU-A605.001)

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-  PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)
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MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

STATE GAME LAND 91

LUZERNE COUNTY, PENNSYLVANIA



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1. Construction activities will be limited to between late-October and February when water levels are at seasonal low.

MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION AND SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

FRANCIS E. WALTER DAM

LUZERNE AND CARBON COUNTIES, PENNSYLVANIA



ABSOLUTE SCALE:
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REFERENCE SCALE:
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1. Mitigation for the pheasant habitat adjacent to the Project's proposed access road will be determined through the licensing process.

MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION OR SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

STATE GAME LAND 40
CARBON COUNTY, PENNSYLVANIA



ABSOLUTE SCALE:
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REFERENCE SCALE:
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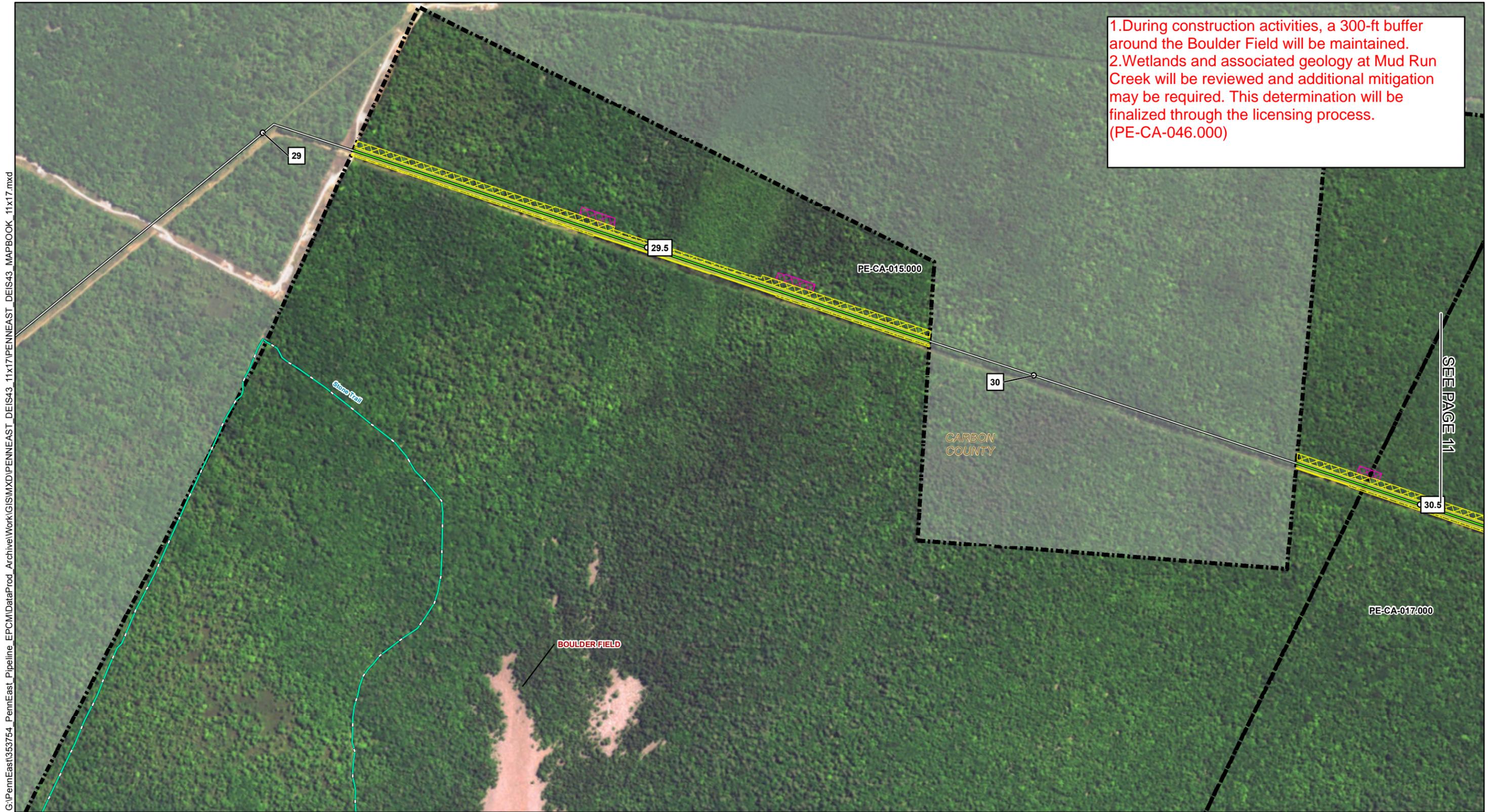
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1. During construction activities, a 300-ft buffer around the Boulder Field will be maintained.
 2. Wetlands and associated geology at Mud Run Creek will be reviewed and additional mitigation may be required. This determination will be finalized through the licensing process.
 (PE-CA-046.000)

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SEE PAGE 11

MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION AND SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

HICKORY RUN STATE PARK
CARBON COUNTY, PENNSYLVANIA



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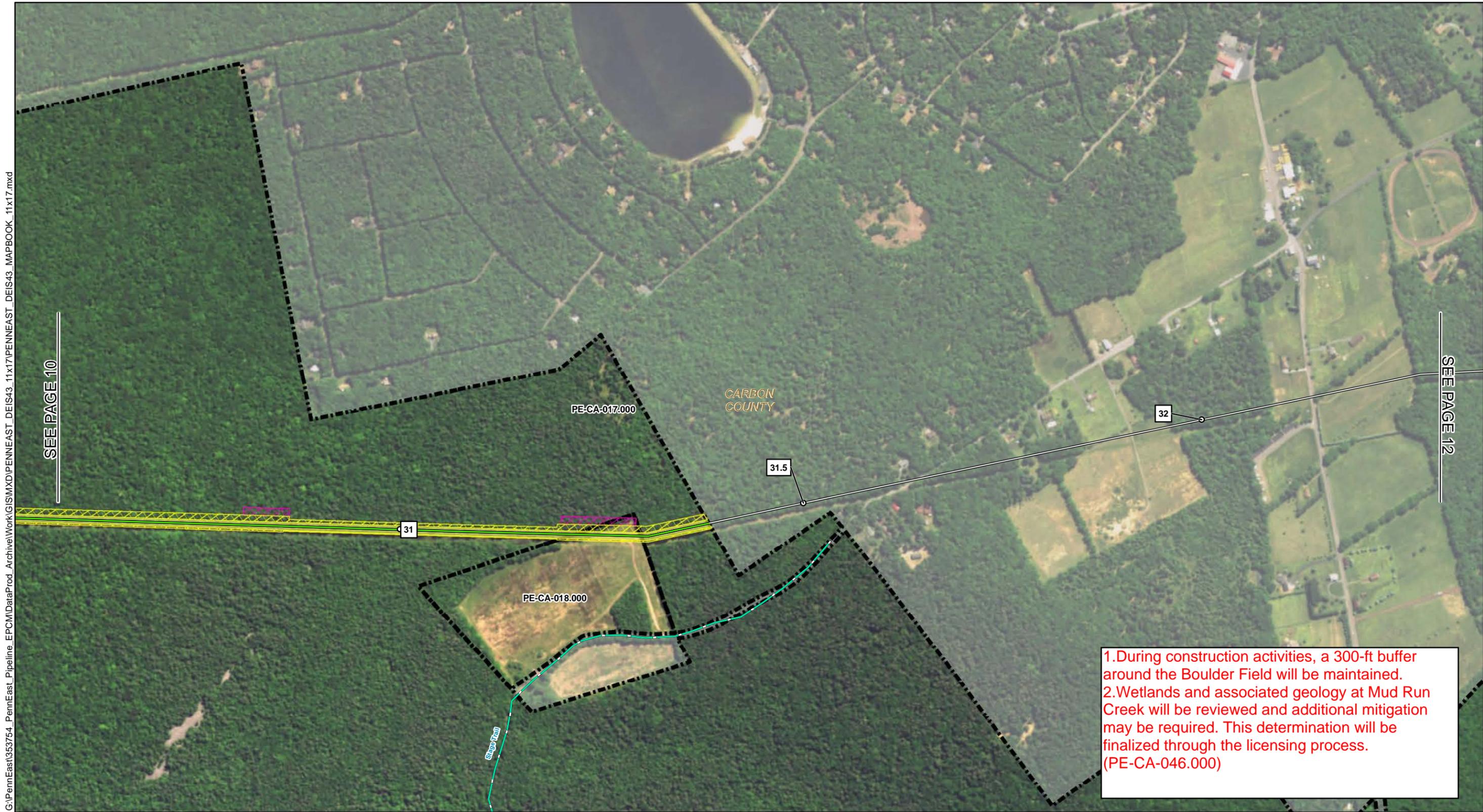
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SEE PAGE 10

SEE PAGE 12



1. During construction activities, a 300-ft buffer around the Boulder Field will be maintained.
 2. Wetlands and associated geology at Mud Run Creek will be reviewed and additional mitigation may be required. This determination will be finalized through the licensing process.
 (PE-CA-046.000)

MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION AND SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

HICKORY RUN STATE PARK
CARBON COUNTY, PENNSYLVANIA



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1. During construction activities, a 300-ft buffer around the Boulder Field will be maintained.
 2. Wetlands and associated geology at Mud Run Creek will be reviewed and additional mitigation may be required. This determination will be finalized through the licensing process. (PE-CA-046.000)

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SEE PAGE 11

SEE PAGE 13

MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION AND SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

HICKORY RUN STATE PARK
CARBON COUNTY, PENNSYLVANIA



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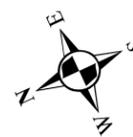
1. During construction activities, a 300-ft buffer around the Boulder Field will be maintained.
 2. Wetlands and associated geology at Mud Run Creek will be reviewed and additional mitigation may be required. This determination will be finalized through the licensing process. (PE-CA-046.000)

[1] MILEPOST	[Yellow] PENNEAST PERMANENT EASEMENT
[Green] PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	[Pink] ACCESS ROAD WORKSPACE/ WAREYARD
[Grey] PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	[Pink with X] PENNEAST TEMPORARY WORKSPACE
[Brown] ACCESS ROAD	[Pink with X] PENNEAST ADDITIONAL TEMPORARY WORKSPACE
[Blue] TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	[Black dashed] COUNTY BOUNDARY
[Black dashed] RECREATION AND SPECIAL USE PROPERTY BOUNDARY	[Black solid] STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

HICKORY RUN STATE PARK
CARBON COUNTY, PENNSYLVANIA



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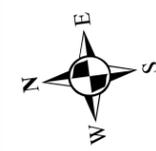
If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.

	MILEPOST		PENNEAST PERMANENT EASEMENT
	PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)		ACCESS ROAD WORKSPACE/ WAREYARD
	PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA		PENNEAST TEMPORARY WORKSPACE
	ACCESS ROAD		PENNEAST ADDITIONAL TEMPORARY WORKSPACE
	TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT		COUNTY BOUNDARY
	RECREATION AND SPECIAL USE PROPERTY BOUNDARY		STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

WEISER STATE FOREST
CARBON COUNTY, PENNSYLVANIA



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If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.

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| MILEPOST | PENNEAST PERMANENT EASEMENT |
| PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) | ACCESS ROAD WORKSPACE/ WAREYARD |
| PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA | PENNEAST TEMPORARY WORKSPACE |
| ACCESS ROAD | PENNEAST ADDITIONAL TEMPORARY WORKSPACE |
| TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT | COUNTY BOUNDARY |
| RECREATION AND SPECIAL USE PROPERTY BOUNDARY | STATE BOUNDARY |

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

STATE GAME LAND 129
CARBON COUNTY, PENNSYLVANIA



ABSOLUTE SCALE:
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REFERENCE SCALE:
1 IN = 600 FT



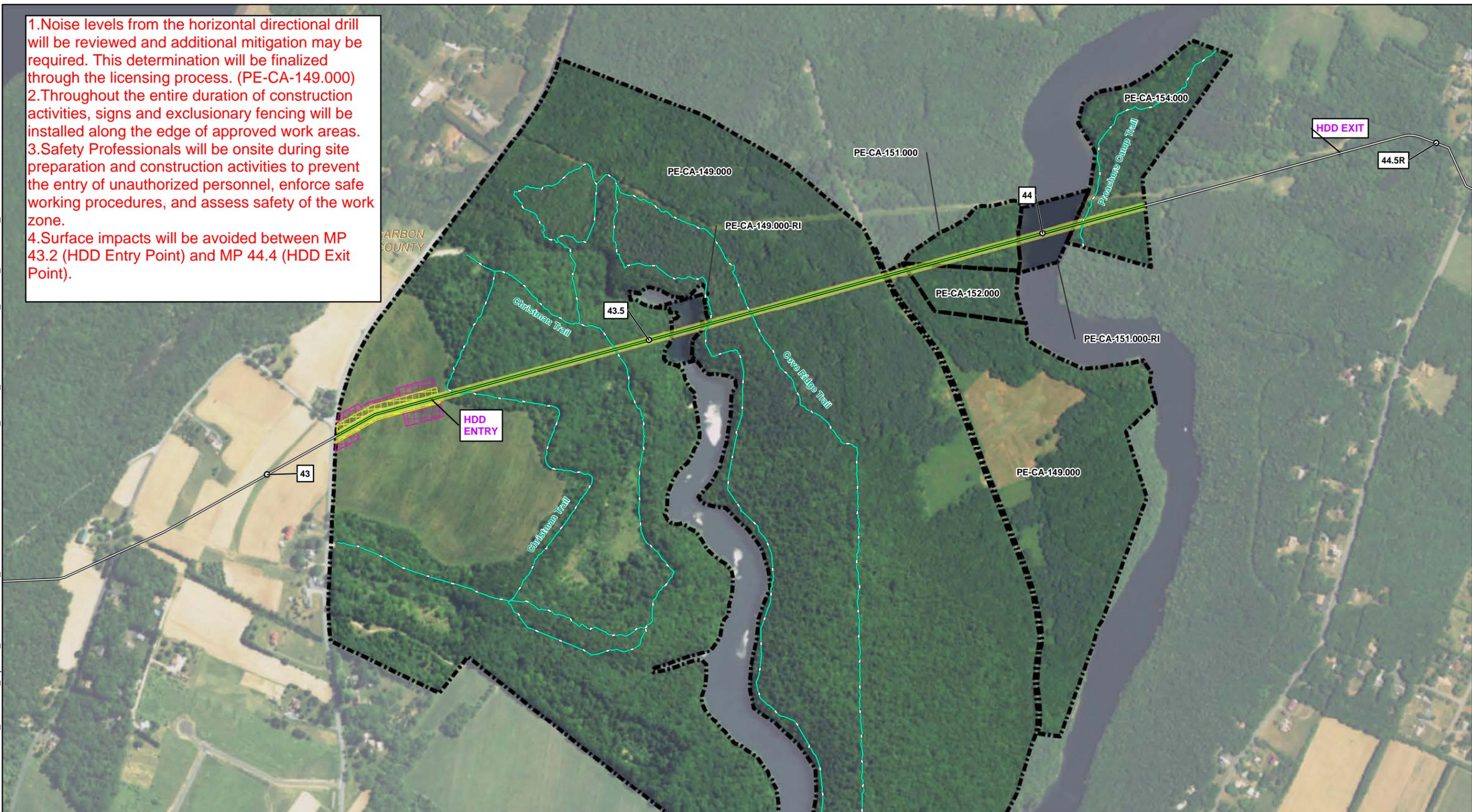
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1.Noise levels from the horizontal directional drill will be reviewed and additional mitigation may be required. This determination will be finalized through the licensing process. (PE-CA-149.000)
 2.Throughout the entire duration of construction activities, signs and exclusionary fencing will be installed along the edge of approved work areas.
 3.Safety Professionals will be onsite during site preparation and construction activities to prevent the entry of unauthorized personnel, enforce safe working procedures, and assess safety of the work zone.
 4.Surface impacts will be avoided between MP 43.2 (HDD Entry Point) and MP 44.4 (HDD Exit Point).



MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION OR SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

BELTZVILLE STATE PARK

CARBON COUNTY, PENNSYLVANIA



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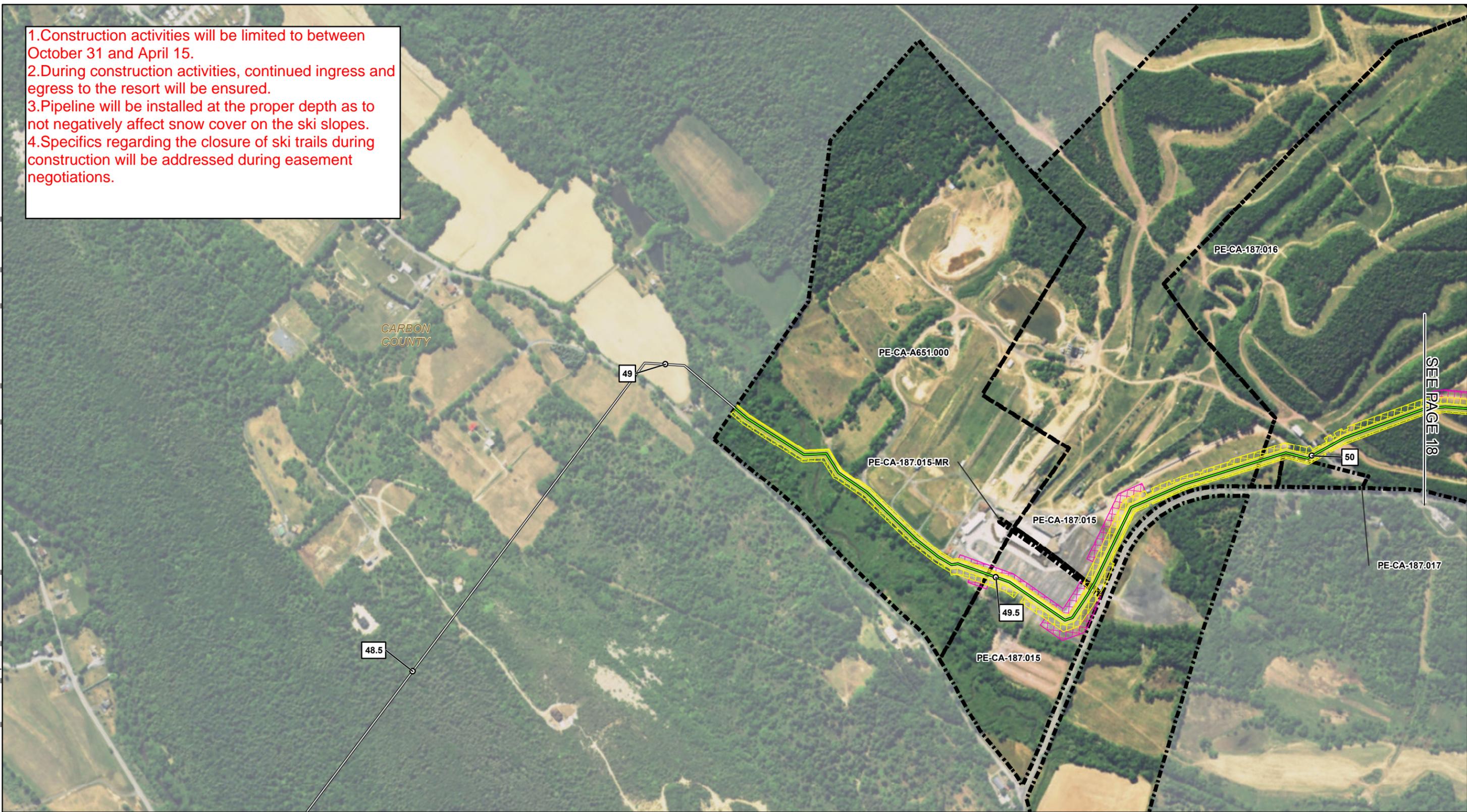
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1. Construction activities will be limited to between October 31 and April 15.
 2. During construction activities, continued ingress and egress to the resort will be ensured.
 3. Pipeline will be installed at the proper depth as to not negatively affect snow cover on the ski slopes.
 4. Specifics regarding the closure of ski trails during construction will be addressed during easement negotiations.

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| MILEPOST | PENNEAST PERMANENT EASEMENT |
| PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) | ACCESS ROAD WORKSPACE/ WAREYARD |
| PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA | PENNEAST TEMPORARY WORKSPACE |
| ACCESS ROAD | PENNEAST ADDITIONAL TEMPORARY WORKSPACE |
| TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT | COUNTY BOUNDARY |
| RECREATION AND SPECIAL USE PROPERTY BOUNDARY | STATE BOUNDARY |

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

BLUE MOUNTAIN SKI AREA
CARBON COUNTY, PENNSYLVANIA



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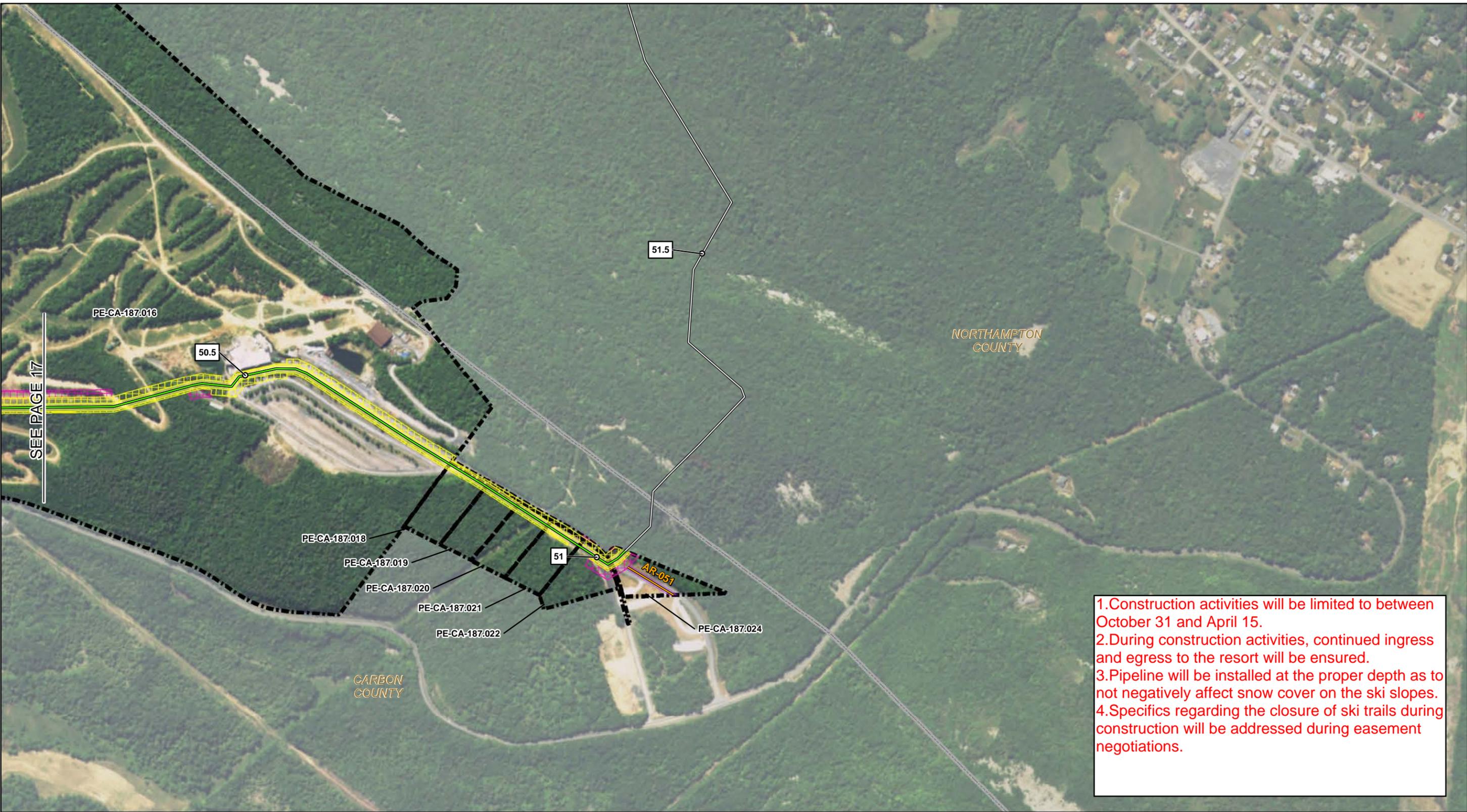


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1. Construction activities will be limited to between October 31 and April 15.
2. During construction activities, continued ingress and egress to the resort will be ensured.
3. Pipeline will be installed at the proper depth as to not negatively affect snow cover on the ski slopes.
4. Specifics regarding the closure of ski trails during construction will be addressed during easement negotiations.

MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION AND SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

BLUE MOUNTAIN SKI AREA
CARBON COUNTY, PENNSYLVANIA



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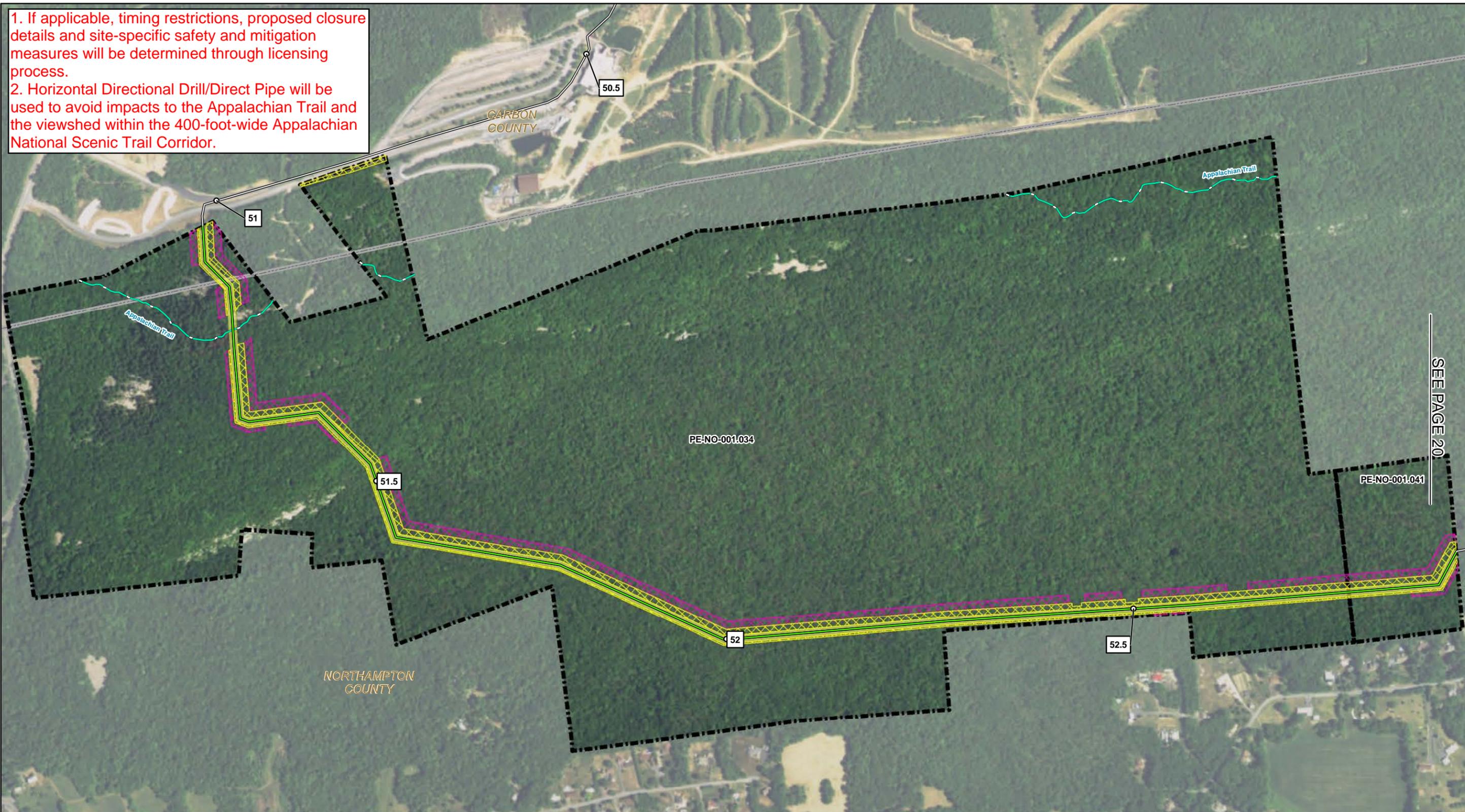
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1. If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.

2. Horizontal Directional Drill/Direct Pipe will be used to avoid impacts to the Appalachian Trail and the viewshed within the 400-foot-wide Appalachian National Scenic Trail Corridor.

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MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION AND SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

STATE GAME LAND 168

CARBON AND NORTHAMPTON COUNTIES, PENNSYLVANIA



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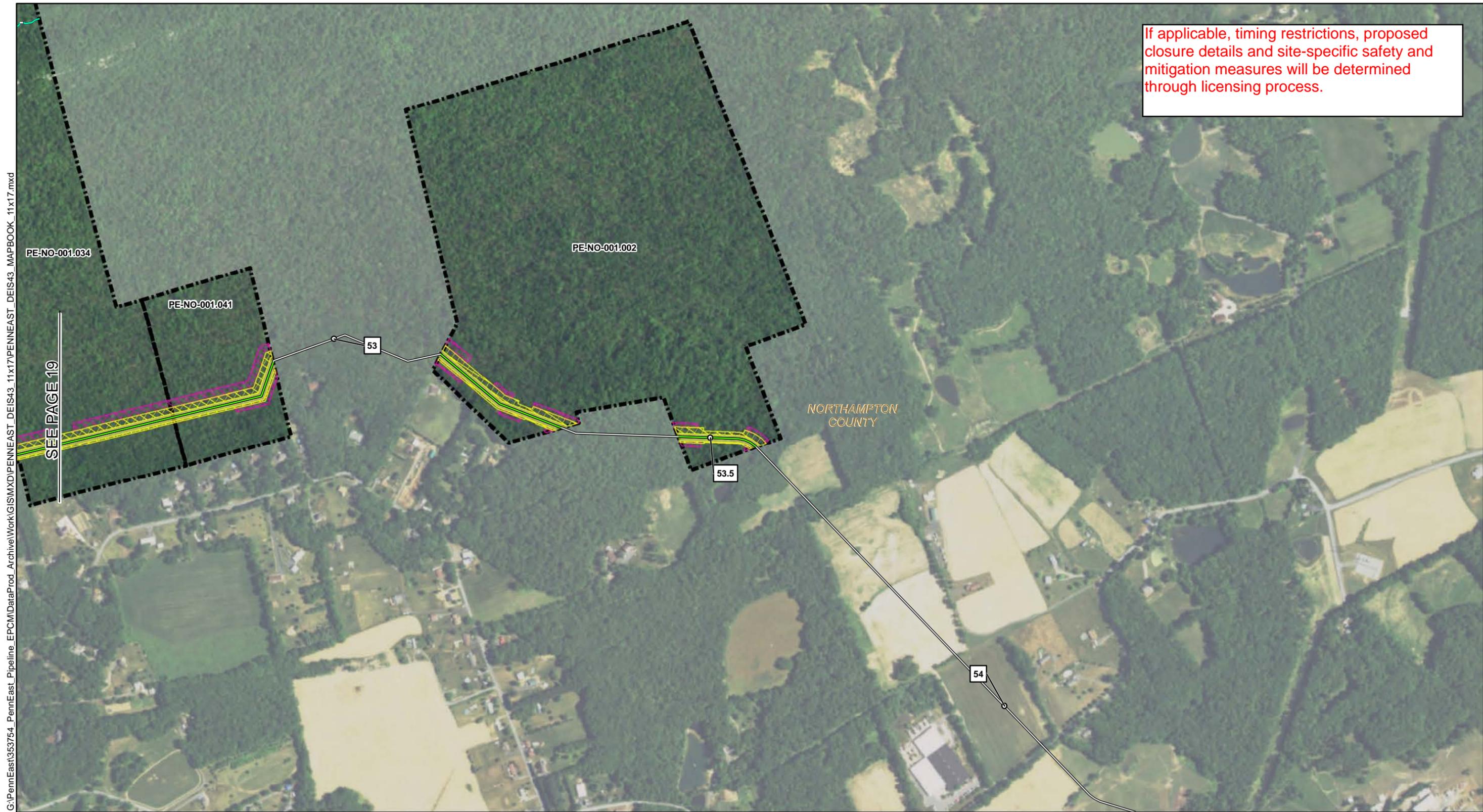
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If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.

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MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION AND SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

STATE GAME LAND 168

NORTHAMPTON COUNTY, PENNSYLVANIA



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1. Access to athletic fields on site may be limited during construction. Specifics regarding this matter will be finalized during easement negotiations.

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| MILEPOST | PENNEAST PERMANENT EASEMENT |
| PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) | ACCESS ROAD WORKSPACE/ WAREYARD |
| PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA | PENNEAST TEMPORARY WORKSPACE |
| ACCESS ROAD | PENNEAST ADDITIONAL TEMPORARY WORKSPACE |
| TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT | COUNTY BOUNDARY |
| RECREATION OR SPECIAL USE PROPERTY BOUNDARY | STATE BOUNDARY |

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

CALVARY BAPTIST CHURCH

NORTHAMPTON COUNTY, PENNSYLVANIA



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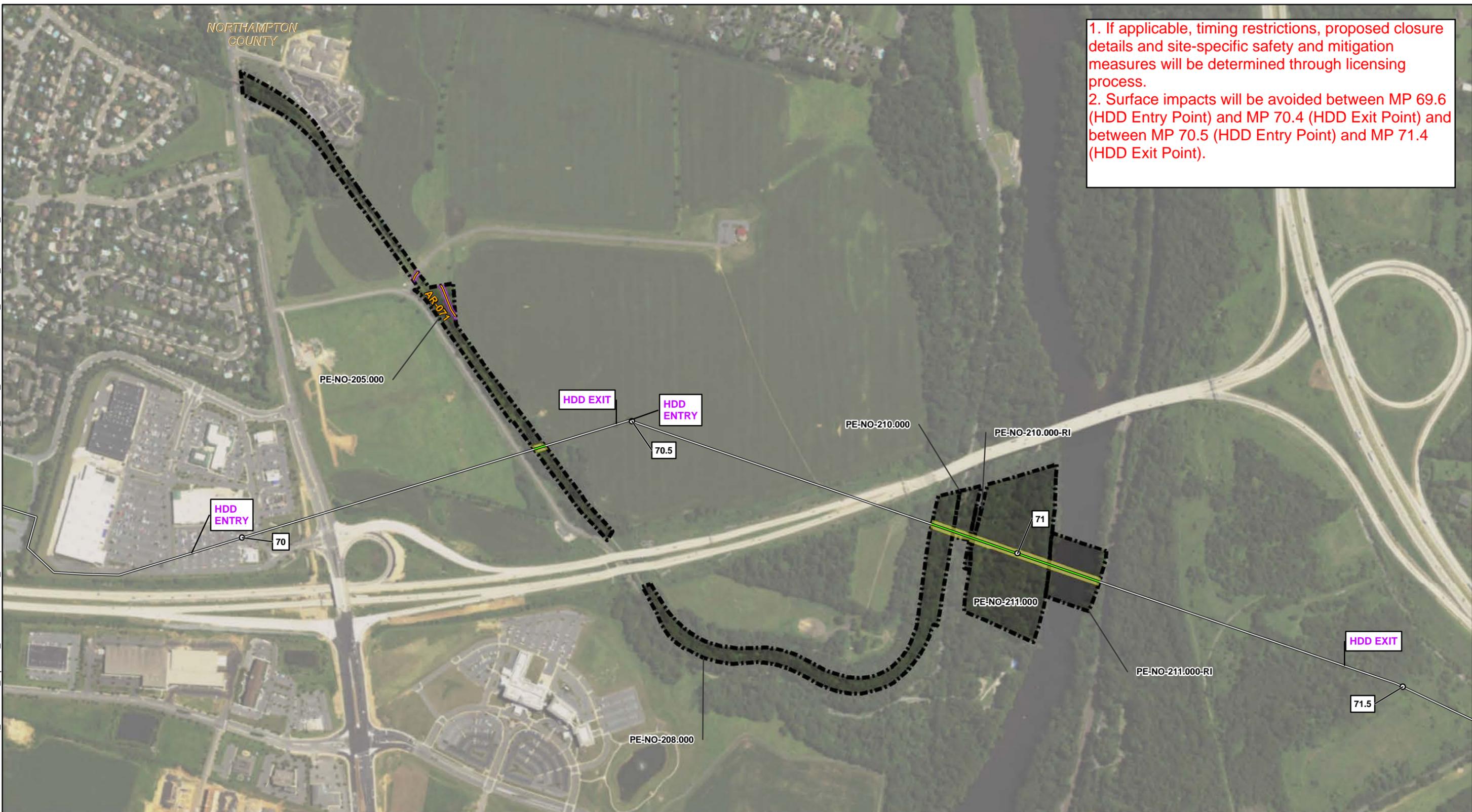
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NORTHAMPTON COUNTY

1. If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.
 2. Surface impacts will be avoided between MP 69.6 (HDD Entry Point) and MP 70.4 (HDD Exit Point) and between MP 70.5 (HDD Entry Point) and MP 71.4 (HDD Exit Point).



MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION OR SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

PALMER BETHLEHEM BIKEWAY, D&L TRAIL LEHIGH CANAL,
AND ADJACENT MUNICIPAL LAND
NORTHAMPTON COUNTY, PENNSYLVANIA



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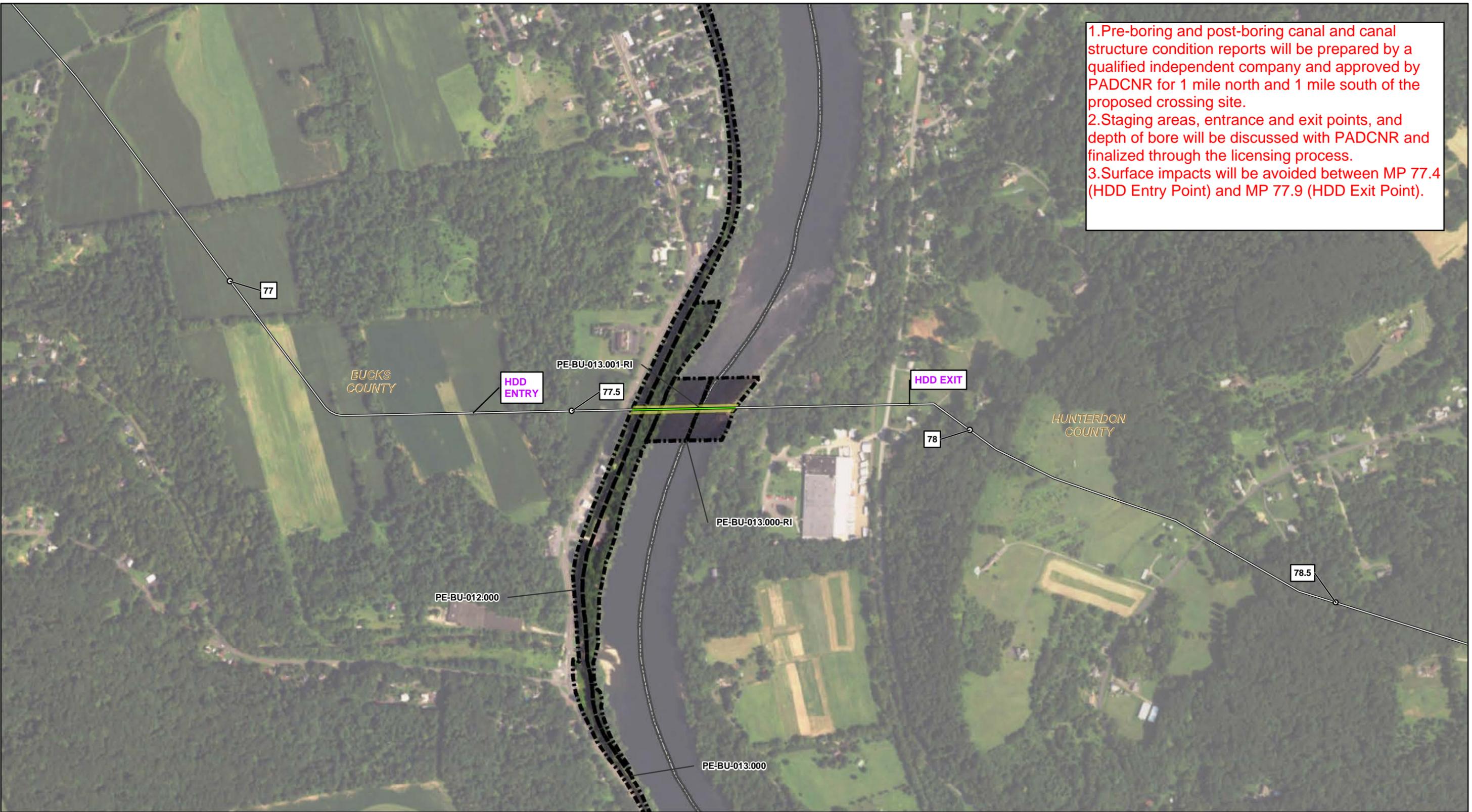


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1. Pre-boring and post-boring canal and canal structure condition reports will be prepared by a qualified independent company and approved by PADCNr for 1 mile north and 1 mile south of the proposed crossing site.
 2. Staging areas, entrance and exit points, and depth of bore will be discussed with PADCNr and finalized through the licensing process.
 3. Surface impacts will be avoided between MP 77.4 (HDD Entry Point) and MP 77.9 (HDD Exit Point).

MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION OR SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

DELAWARE CANAL STATE PARK
BUCKS COUNTY, PENNSYLVANIA



ABSOLUTE SCALE:
1:7,200

REFERENCE SCALE:
1 IN = 600 FT



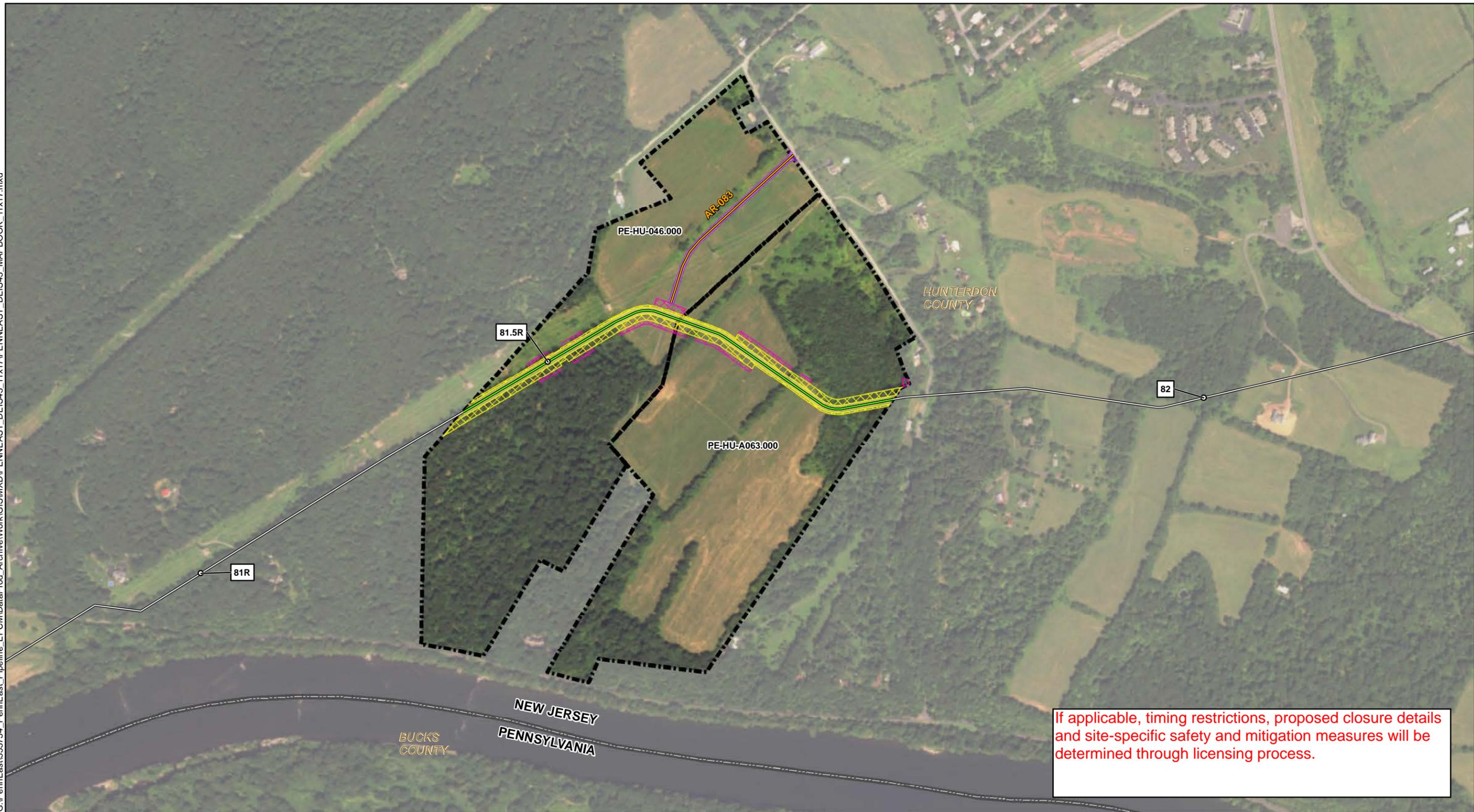
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MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

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If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.

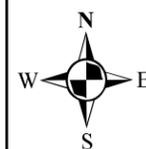
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|--|---|
| MILEPOST | PENNEAST PERMANENT EASEMENT |
| PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) | ACCESS ROAD WORKSPACE/ WAREYARD |
| PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA | PENNEAST TEMPORARY WORKSPACE |
| ACCESS ROAD | PENNEAST ADDITIONAL TEMPORARY WORKSPACE |
| TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT | COUNTY BOUNDARY |
| RECREATION OR SPECIAL USE PROPERTY BOUNDARY | STATE BOUNDARY |

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

GRAVEL HILL PRESERVE

HUNTERDON COUNTY, NEW JERSEY



ABSOLUTE SCALE:
1:7,200

REFERENCE SCALE:
1 IN = 600 FT

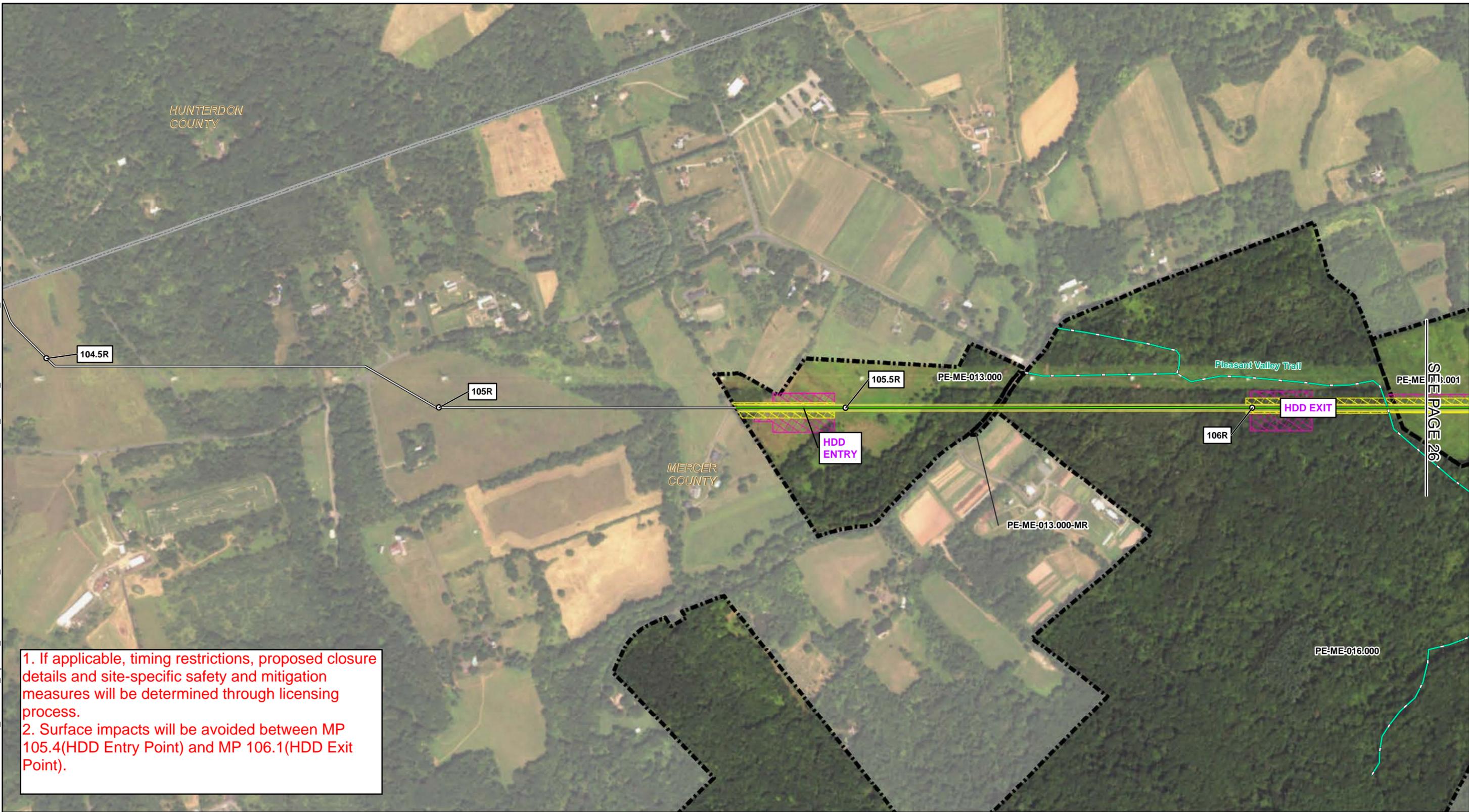


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1. If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.

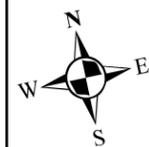
2. Surface impacts will be avoided between MP 105.4(HDD Entry Point) and MP 106.1(HDD Exit Point).

MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION OR SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

TED F. STILES PRESERVE AT BALDPATE MOUNTAIN
AND AFFECTED MERCER COUNTY PARCELS
MERCER COUNTY, NEW JERSEY



ABSOLUTE SCALE:
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REFERENCE SCALE:
1 IN = 600 FT



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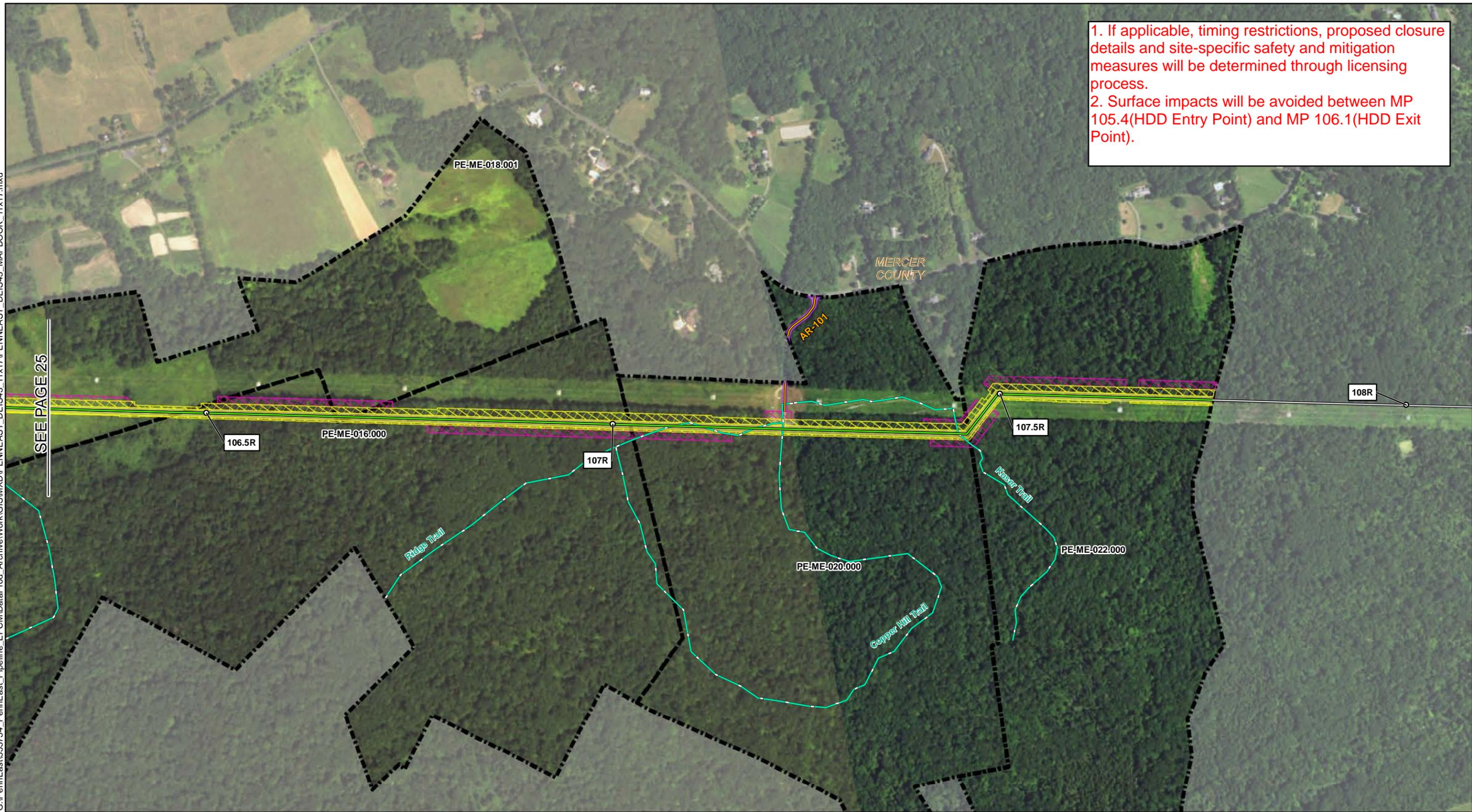
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SEE PAGE 26

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1. If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.
 2. Surface impacts will be avoided between MP 105.4(HDD Entry Point) and MP 106.1(HDD Exit Point).

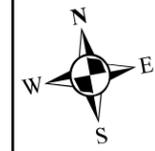


MILEPOST	PENNEAST PERMANENT EASEMENT
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)	ACCESS ROAD WORKSPACE/ WAREYARD
PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA	PENNEAST TEMPORARY WORKSPACE
ACCESS ROAD	PENNEAST ADDITIONAL TEMPORARY WORKSPACE
TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT	COUNTY BOUNDARY
RECREATION OR SPECIAL USE PROPERTY BOUNDARY	STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

TED F. STILES PRESERVE AT BALDPATE MOUNTAIN
 AND AFFECTED MERCER COUNTY PARCELS
 MERCER COUNTY, NEW JERSEY



ABSOLUTE SCALE:
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REFERENCE SCALE:
1 IN = 600 FT



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If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.

SEE PAGE 28

- MILEPOST
- PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)
- PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA
- ACCESS ROAD
- TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT
- RECREATION OR SPECIAL USE PROPERTY BOUNDARY
- PENNEAST PERMANENT EASEMENT
- ACCESS ROAD WORKSPACE/ WAREYARD
- PENNEAST TEMPORARY WORKSPACE
- PENNEAST ADDITIONAL TEMPORARY WORKSPACE
- COUNTY BOUNDARY
- STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

JACOB'S CREEK TRAIL
MERCER COUNTY, NEW JERSEY



ABSOLUTE SCALE:
1:7,200

REFERENCE SCALE:
1 IN = 600 FT



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MERCER COUNTY

PE-ME-037.000

110.5

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110R

HDD ENTRY

HDD EXIT

PE-ME-035.000

PE-ME-037.000-CR

Woolsey Park Trail

SEE PAGE 27

If applicable, timing restrictions, proposed closure details and site-specific safety and mitigation measures will be determined through licensing process.

- MILEPOST
- PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016)
- PROPOSED PENNEAST PIPELINE CENTERLINE (FEBRUARY 2016) OUTSIDE SPECIAL USE AREA
- ACCESS ROAD
- TRAILS IMPACTED BY PROPOSED PENNEAST PROJECT
- RECREATION OR SPECIAL USE PROPERTY BOUNDARY
- PENNEAST PERMANENT EASEMENT
- ACCESS ROAD WORKSPACE/ WAREYARD
- PENNEAST TEMPORARY WORKSPACE
- PENNEAST ADDITIONAL TEMPORARY WORKSPACE
- COUNTY BOUNDARY
- STATE BOUNDARY

MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY

PENNEAST PIPELINE PROJECT RECREATION AND SPECIAL USE AREAS

WOOLSEY PARK
MERCER COUNTY, NEW JERSEY



ABSOLUTE SCALE:
1:7,200

REFERENCE SCALE:
1 IN = 600 FT



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