SUNOCO PIPELINE L.P.

Pennsylvania Pipeline Project

Impact Avoidance, Minimization, and Mitigation Procedures

in support of

Joint Permit Application for a

Pennsylvania Water Obstruction & Encroachment Permit and a U.S. Army Corps of Engineers Section 404 Permit Application

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^{0}	degree
AASHTO	American Association of State Highway and Transportation Officials
ATON	Aids to Navigation
BMPs	Best Management Practices
CEI	Chief Environmental Inspector
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
CFS	compost filter stock
DOT	Department of Transportation
ECB	erosion control blanket
ECC	Environmental Compliance Coordinator
ECP	Environmental Compliance Program
EI	Environmental Inspector
EIM	Environmental Inspection Manager
ESCGP-2	Erosion and Sediment Control General Permit-2
E&S	Erosion and Sediment
E&SC	Erosion and Sediment Control
E&S Plan	Erosion and Sediment Control and Site Restoration Plan
EV	exceptional value
FACW	facultative wetland
gpm	gallons per minute
HDPE	high-density polyethylene
HQ	high quality
IR Plan	Inadvertent Return Assessment, Preparedness, Prevention and Contingency Plan
LEI	Lead Environmental Inspector
LOD	Limit of Disturbance
MARV	Minimum Average Roll Value
MOC	Management of Change
NGL	Natural Gas Liquid
NPDES	National Pollutant Discharge and Elimination System
O&M	Operation and Maintenance
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PAFBC	Pennsylvania Fish and Boat Commission
PAG-10	Pennsylvania General Permit 10
PFO	Palustrine Forested
PG	Professional Geologist
PGC	Pennsylvania Game Commission
PNDI	Pennsylvania Natural Diversity Inventory
PPC Plan	Preparedness, Prevention and Contingency Plan
PPP	Pennsylvania Pipeline Project
Project	Pennsylvania Pipeline Project
PSS	Palustrine Scrub-Shrub
PWS	public water source
ROW	right-of-way

SPLP	Sunoco Pipeline L.P.
SWS	surface water source
TSS	total suspended solids
U.S.	United States
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
Void Mitigation Plan	Void Mitigation Plan for Karst Terrain and Underground Mining
Water Supply Plan	Water Supply Assessment, Preparedness, Prevention and Contingency Plan

1.0 INTRODUCTION

Sunoco Pipeline L.P. (SPLP) proposes to construct and operate the Pennsylvania Pipeline Project (Project or PPP) that would expand existing pipeline systems to provide natural gas liquid (NGL) transportation. The Project involves the installation of two parallel pipelines within an approximately 306.8-mile, 50-foot-wide right-of-way (ROW) from Houston, Washington County, Pennsylvania to SPLP's Marcus Hook facility in Delaware County, Pennsylvania with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline will be installed within the ROW from Houston to Marcus Hook (306.8 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, Pennsylvania to the Marcus Hook facility, paralleling the initial line for approximately 255.8 miles. The majority of the new ROW will be co-located adjacent to existing utility corridors, including approximately 230 miles of pipeline that will be co-located in the existing SPLP Mariner East pipeline system.

SPLP has developed these Impact Avoidance, Minimization, and Mitigation Procedures, or "Project Procedures" specifically for the Project. SPLP provides the specifications in these Project Procedures to be used during the construction, operation and maintenance of the Project. The Project Procedures describe the environmental best management practices that SPLP and its Contractors will implement during construction, restoration, operations, and maintenance activities to protect the environment and minimize potential effects of the Project on waters of the Commonwealth. These Project Procedures are proposed for implementation for the final Project design and do not discuss alternatives, avoidance, and minimization efforts enacted during the planning and design stages of Project development, which are outlined within the Project's Alternatives Analysis provided in Attachment 11, Enclosure E, Part 3.

Additionally, the Project Procedures have been developed in conjunction with and to meet all best management practices (BMPs) and notes outlined within the Erosion and Sediment Control and Site Restoration Plans prepared to support the Project's application for the Erosion and Sediment Control General Permit-2 (ESCGP-2).

The resulting Project impacts after implementation of these procedures are thoroughly discussed within Attachment 11, Enclosure D which provides a County-specific discussion of impacts and Attachment 11, Enclosure E, Part 2 which provides a comprehensive discussion of the impacts for the entire Project. These Project Procedures ensure that the impacts to waters of the Commonwealth remain minor and temporary as discussed within those attachments.

The Project is thoroughly described and provided in Attachment 9 of the Joint Permit Application. The Project Description provides a listing and description of all of the Project components, activities, and methods of installation, including the following general construction and specialized construction topics:

- Marking the Corridor and Sensitive Areas
- Clearing, E&S Control, Grading, and Fencing
- Trenching
- Pipe Stringing
- Pipe Preparation and Lowering-In
- Backfilling and Grade Restoration
- Hydrostatic Testing
- Clean-up and Restoration

- Cathodic Protection
- Block Valves
- Pump Stations
- Steep Topography
- Void Mitigation
- Residential Areas
- Agricultural Lands
- Road and Rail Road Crossings
- Utility Crossings
- Horizontal Directional Drill Crossings
- Waterbody and Wetland Crossing Construction
- Rock and Bedrock

2.0 OTHER PROJECT PLANS

Given the size and nature of the Project, several other Project plans are referenced throughout this document where appropriate. When referenced, they become part of the Project Procedures to ensure impacts are avoided, minimized, and mitigated. Plans referenced within this document include:

- Erosion and Sediment Control and Site Restoration Plan (E&S Plan)
- Prevention, Preparedness, and Contingency Plan (PPC Plan)
- Water Supply Assessment, Prevention, Preparedness and Contingency Plan (Water Supply Plan)
- Inadvertent Return Assessment, Prevention, Preparedness, and Contingency Plan (IR Plan)
- Void Mitigation Plan for Karst Terrain and Underground Mining (Void Mitigation Plan)
- Aids to Navigation (ATON) Plans
- Compensatory Mitigation Plan
- PADCNR Conservation Plan for Identified Species of Special Concern
- PGC Eastern Small-footed Bat Conservation Plan
- PGC Allegheny Woodrat Conservation Plan
- PAFBC Timber Rattlesnake Conservation Plan
- USFWS Bog Turtle Conservation Plan
- USFWS Northeastern Bulrush Conservation Plan
- USFWS Myotis Conservation Plan
- USFWS Migratory Bird Habitat Conservation Plan

3.0 SPILL PREVENTION AND PREPAREDNESS

SPLP has developed four plans that accompany the E&S Plan that are designed to assess the potential impacts and provide for the protection of upland areas, and surface and groundwater from impacts due to Project activities. The overarching PPC Plan is designed to address release prevention in general, and potential impacts to surface waters and public and private

water supplies in particular have been analyzed and addressed within two supplemental plans to the PPC Plan; the Water Supply Plan and the IR Plan. The Water Supply Plan provides for the assessment of the existing environment in terms of public and private water supplies in or along the Project areas and impacted waters, as well as the prevention and preparedness measures to be implemented to protect those supplies. The IR Plan outlines the preconstruction activities implemented to ensure sound geological features are included in the Horizontal Directional Drilling (HDD) profile, the measures to prevent impact, and the preparedness plan if an impact were to occur. In addition, a Void Mitigation Plan is provided as part of the E&S Plan and provides an assessment of potential impacts and avoidance and mitigation measures during open-cut and drilling procedures. The purpose of these plans are to protect groundwater resources Project-wide. Attachment 12 of the Project's Chapter 105 Joint Permit Application includes these four plans.

4.0 SUPERVISION AND INSPECTION

All aspects of construction, operation, and maintenance of the PPP is supervised by SPLP personnel. Utility or "Craft" inspectors working on behalf of SPLP are staffed throughout all phases of construction to ensure the facilities are installed in accordance with SPLP, state, local, and federal specifications and standards.

Supplemental to the Utility Inspection Program, SPLP will implement a comprehensive Environmental Compliance Program (ECP). The ECP encompasses highly integrated and essential program elements designed to ensure compliance with the requirements of the E&S Plan, permit conditions, and approved mitigation measures and commitments. Each of these elements is incorporated into the single integrated ECP organization structure and execution plan. The primary elements of the ECP are:

- Environmental training;
- Environmental inspection;
- Biological and cultural resource monitoring; and,
- Agency and Project team notification and documentation requirements.

Preconstruction, construction, and post-construction survey and monitoring for sensitive species as outlined within the final Pennsylvania Natural Diversity Inventory (PNDI) agency letters and approved conservation plans will be followed. The ECP personnel and SPLP will be responsible to ensure only approved specialists conduct the monitoring or mitigation tasks in accordance with obtained clearances.

4.1 Environmental Training

SPLP will execute two levels of environmental training:

- Supervisor Training – Conduct the environmental training for SPLP, Construction Contractor, and Environmental Inspection leads prior to commencement of construction activities; and,
- Construction Contractor Personnel Training – Provide daily environmental training to new Construction Contractor personnel on each Spread, each morning, and before each new member begins work.

Training will involve the presentation of all pertinent environmental restrictions to Project personnel. This will be in the form of a formal, pre-prepared presentation that includes a discussion of the environmental conditions, restrictions, and notifications required for the

Project. The training will outline the major environmental restrictions and provide the location of all environmental permits, conditions, guidance, and plans. Contact and notification procedures will be reviewed in detail. All aspects of the construction sequence will be reviewed and relevant restrictions discussed. All personnel entering the workspaces on the Project will require this formal training.

4.2 Environmental Inspection

The ECP team will consist of a field component and an office-based component that will work in unison to ensure compliance during the Project. The field component will be managed by the Environmental Inspection Manager (EIM), and the office component will be led by the Environmental Compliance Coordinator (ECC). The EIM will lead a team of Chief, Lead, and staff Environmental Inspectors. The ECC will be supported by various field and office based specialties. These positions are described below.

The Project will be staffed with a combination of full-time staff and environmental inspection personnel who have previously worked for the company on projects over the last few years, including projects in Pennsylvania. These personnel have previous high-profile, environmentally sensitive, pipeline environmental inspection experience; technical degrees; excellent working skills; and have completed projects effectively and successfully with minimal concerns.

The ECP field component would consist of Chief Environmental Inspectors (CEIs), Lead Environmental inspectors (LEIs), Environmental Inspectors (EIs), biological monitors, and professional consultants. SPLP will also staff a Permit Coordinator to assist in the oversight of the daily program in the field, coordinate all of the sampling needed during activities such as HDD and hydrotesting, as well as being a central point of contact for the distribution of information across the Project. SPLP will also provide all cultural and biological monitoring, including specialized services that require certified monitors such as timber rattlesnake and bog turtle.

<u>Chief Environmental Inspector</u>

The CEI shall be responsible for the oversight of environmental compliance and spend their time coordinating the environmental compliance of the Project and the EI staff, including any specialty biological and cultural monitors. The CEI will support the LEIs by: resolving conflict; scheduling inspection services; resolution of noncompliance issues; coordination between the LEIs, the construction staff, and construction inspection staff; and coordination with agencies as necessary. The CEI must work closely with the SPLP Project Managers, Land Department, the contractors, and the inspection staff to ensure compliance with all permit conditions. The CEI will have extensive experience in environmental construction inspection and substantial industry related environmental training. The CEI will have the experience, knowledge and ability to communicate with federal, state, county, and local environmental agency representatives and have excellent communication and documentation skills, with an emphasis in computer software usage. Each CEI shall be responsible for the following:

- The CEI shall report to the SPLP Environmental Manager and construction Chief Inspector and spend 100% of their time coordinating the environmental compliance of the Project and the EI staff, including the biological and archeological monitors as necessary. The CEI will be held responsible for the oversight of all the in-field construction environmental compliance.
- The CEI shall support the LEIs by resolving conflict, scheduling inspection services, managing resolution of noncompliance issues, coordination between

the LEI and the construction staff and construction inspection staff, and coordination with agencies as necessary.

- The CEI must work closely with the SPLP's Land Department, the Construction Contractors, and the inspection staff to ensure environmental compliance with all permits.
- The CEI will be work closely with the Permit coordinators and be responsible for the coordination of the Management of Change (MOC) process.
- The CEI must have the capability to define, differentiate and delineate environmental resources.

Lead Environmental Inspector

The LEI shall be responsible for the inspection and monitoring of the day-to-day construction activities within their assigned spread and will report to the Spread Construction Manager. The LEI will attend any daily meetings that may be setup by the Spread Construction Manager, train new Construction Contractor personnel, and be involved in the inspection of compliance with environmental requirements and/or permit conditions specific to that Spread. The LEI will support the CEI by inspecting and reporting the daily environmental construction inspection reports for the Spread, which will be forwarded to the CEI for inclusion into the overall Project Environmental Report. The LEI will direct and provide oversight and guidance to a team of EIs inspecting and working with the on-site Construction Craft Inspectors. The LEI will resolve, clarify or assure necessary precautions are taken or permit conditions implemented by the Construction Craft Inspection Team and Construction Contractor to maintain compliance with the applicable environmental requirements on the Spread. The LEI will have the capability to define, differentiate and delineate environmental resources, have extensive experience (5-10 years) of Environmental Construction Inspection, and substantial industry related environmental training. The LEI shall have the experience, knowledge and ability to communicate with federal, state and local environmental agency representatives and have excellent communication and documentation skills, with an emphasis in computer software usage. The LEI should have experience in the project area.

- The LEI shall spend the majority of their time in the field involved in inspection of compliance with environmental requirements and/or permit conditions specific to that Spread.
- The LEI shall support the CEI by inspecting and compiling the daily environmental construction inspection reports for the Spread, which will be forwarded to the CEI for inclusion into the overall Project Environmental Report.
- The LEI shall direct and provide oversight and guidance to a team (consisting of one or more) EIs inspecting and working with the on-site Construction Inspectors.
- The LEI shall resolve, clarify or assure necessary precautions are taken or permit conditions implemented by the Construction Inspection Team and Construction Contractor to maintain compliance with the applicable environmental requirements on the Spread.
- The LEI shall attend daily spread meetings and will have multiple reporting responsibilities to the Spread Construction Manager and CEI.
- The LEI will be work closely with the CEI and be responsible for the initiation and implementation of the Management of Change (MOC) process.
- The LEI is not required to have an environmental or biological college degree, but must have the capability to define, differentiate and delineate environmental resources. The LEI shall have extensive experience (5-10 years) of

Environmental Construction Inspection and substantial industry related environmental training. The LEI shall have the experience, knowledge and ability to communicate with federal, state and local environmental agency representatives and have excellent communication and documentation skills, with an emphasis in computer software usage.

Environmental Inspector

Each EI shall report to and work with the LEI to which they are assigned. The EI will be responsible for the inspection and monitoring of the day-to-day construction activities within their assigned Spread. The EI shall spend 100% of their time in the field and if deemed necessary or applicable may or may not be required to attend the daily construction spread meetings set up by the Spread Chief Inspector. The EI will work with the various Craft Inspectors and the Construction Contractor to maintain compliance with applicable environmental requirements specific to the ongoing activities. The EI may participate in tailgate discussions, meetings, or necessary site specific training, and may oversee the completion of the overall Project Environmental training of new Construction Contractor Personnel. The EI should have an Environmental, Biological, or Cultural Resource college degree and the educational expertise to be able to define and delineate environmental resources and/or sensitive areas. The EI shall be familiar with, understand and interpret permit conditions and requirements and be able to relay this information to the Construction Craft Inspector and Construction Contractor to assure correct installation or implementation of construction materials or techniques to meet the permit conditions. The EI shall be responsible for inspecting and daily reporting to the LEI on the daily construction activities for which they are responsible.

- The EI shall spend their time in the field and may attend the daily construction spread meetings setup by the Spread Construction Manager. The EI shall work with the various Construction Inspectors and the Construction Contractor to maintain compliance with applicable environmental requirements specific to the ongoing activities.
- The EI may participate in tailgate discussions, meetings or necessary site specific training, and may oversee the completion of the overall Project Environmental Training of new Construction Contractor personnel.
- The EI shall be familiar with, understand and interpret permit conditions and requirements and be able to relay this information to the Construction Inspector and Construction Contractor to assure correct installation or implementation of construction materials or techniques to meet the permit conditions.
- The EI shall be responsible for inspecting and daily reporting to the LEI on the construction activities for which they are responsible.
- The EI should have an Environmental, Biological or Cultural Resource college degree (or relevant experience).
- The EI will review all Project documents (ROW descriptions, permits, alignment sheets, and relevant plans) for its Spread prior to construction.
- The EI shall inspect activities daily to verify that Contractors are complying with the environmental conditions and mitigation measures, and applicable federal, state, and local permit requirements and landowner agreements.
- The EI shall identify, document, and oversee corrective actions, as necessary to bring an activity back in to compliance.
- The EI shall inspect that the limits of disturbance are properly marked before clearing begins.

- The EI shall verify the location of signs and highly visible flagging marking the boundaries of sensitive resource areas along the construction work area such as waterbodies, wetlands, or areas with special requirements.
- The EI shall coordinate with water and wetland resource agencies to assure the Project Procedures are properly implemented.
- The EI shall inspect and photo-document sensitive areas and workspaces before, during, and after construction.
- The EI shall ensure that construction activities occur within authorized work areas.
- The EI shall inspect the location of pumped water filter bags to ensure they are located in well-vegetated (grassy) areas, and discharge onto stable erosion resistant areas. Where this is not possible, a geotextile underlayment and flow path shall be provided.
- The EI shall ensure that topsoil is stripped, stockpiled, and appropriately segregated (where required).
- The EI shall inspect that all erosion and sediment controls (E&SCs) will be properly maintained. Inspections of E&SC features will occur on a weekly basis and after precipitation events and will be recorded on the appropriate inspection forms.
- The EI shall ensure preventative and corrective maintenance work, including clean out, repair, replacement, regrading, reseeding, and remulching will be performed as soon as practical. If E&SCs fail to perform as expected, replacements or modifications of those installed will be implemented at the direction of the EI.
- The EI shall inspect the repair of all ineffective temporary erosion control measures within 24 hours of repair completion.
- The EI shall maintain a log showing dates that E&S BMPs were inspected as well as any deficiencies found and the date they were corrected. These logs shall be maintained on the site and be made available to representatives of the County Conservation District or Pennsylvania Department of Environmental Protect (PADEP).
- The EI shall provide updated environmental training as new contracted personnel begin working on construction.
- The EI shall inspect that all trash is picked up and contained in an approved container for proper disposal.
- The EI shall ensure that the Contractor maintains an orderly storage of chemicals, supplies, and parts.
- The EI shall ensure prompt removal of small spillages to prevent discharge from site and proper disposal of spilled material.
- The EI shall ensure the Contractor has the Project's PPC Plan on-site and understands its implementation.
- The EI will work with the ECC to ensure the appropriate PPC procedures are followed in regards to the unanticipated discovery of impacted soil.
- The EI shall ensure all proper environmental notifications are made in accordance with the Project's PPC Plan.
- The EI will perform routine monitoring to determine the general physical condition of the entire Spread, including liquid levels in tanks, quality of site runoff, quality of any waste to be disposed of, etc.

- The EI will ensure that the Contractor conducts training for spill prevention and impact minimization.
- With the exception of certain water pump locations, ensure sites for refueling and routine servicing of equipment and storage of fuels, lubricants, and any other materials that could potentially contaminate waterbodies and wetlands are located in upland locations at least 100 feet from the edge of the nearest waterbody and wetland.
- The EI shall ensure that the Contractor maintains adequate supplies of suitable absorbent material and any other supplies and equipment necessary for the immediate containment and cleanup of releases.
- The EI shall ensure that back-up equipment is present at all dry pump bypass stream crossings.

Biological and Cultural Resource Monitors

Biological Monitors will have experience with rattlesnake and bog turtle monitoring in Pennsylvania and be on the qualified list of contractors, if one is maintained by the appropriate resource agency. Cultural Resource Monitors will be on the qualified list of contractors maintained by the Pennsylvania Historical and Museum Commission. Monitors will:

- Be approved by the Pennsylvania as monitors (as required).
- Be onsite when monitoring is required, including but not limited to, when construction activities are occurring, travel along access roads, and active construction activity at ancillary facilities.
- Be able to comply with the permit, agency determination letters, and Project Conservation Plan requirements as they pertain to handling, monitoring, and reporting.

Professional Geologists

Each of the six construction spreads for the Project will field a team of EIs, one of which will be a licensed Professional Geologist (PG) experienced in the field of hydrogeology.

The minimum requirements of the PG shall include the following:

- Current PG license in Pennsylvania.
- Experienced in the field of hydrogeology.
- Previous experience with linear pipeline projects.
- Previous experience with HDD installations.

The PG will primarily focus on areas of trenchless construction activities, and monitor Contractor performance with trenchless construction, which performance will be evaluated on its compliance with permit terms and conditions, construction drawings, technical specifications, PPC Plan requirements, and easement agreements. The PG will immediately notify the ECC if the Trenchless Construction Contractor fails to conform to these required standards, or if unexpected problems are encountered.

PGs will be consulted when karst/openings or when groundwater seeps are encountered. SPLP has evaluated the potential for all wetlands to contain fragipan soils or other confining layers through an investigation of the USDA soil series as well as field data collected during

wetland delineations and functions and value assessments. The Restrictive Layer and Fragipan Analysis and Methodology is located within Appendix C. A licensed PG will use the data in Appendix C to identify wetlands with the potential for restrictive layers. The PG will be present to evaluate each wetland that is found to have a potential confining layer during trenching. During trenching of these wetlands, the PG will advise on the segregation (e.g., triple ditching) of confining layers for proper restoration of subsurface conditions. At wetlands determined to require confining layer restoration, the PG will be on-site during subsurface soil backfilling to ensure proper soil layer restoration. PGs may advise on bentonite or bentonite sandbag layering along the entire or portions of the trench line at the appropriate height if an identified confining layer cannot be segregated and/or restored properly.

5.0 THREATENED AND ENDANGERED SPECIES

SPLP has coordinated extensively with the Pennsylvania Department of Conservation and Natural Resources (PADCNR), Pennsylvania Game Commission (PGC), Pennsylvania Fish and Boat Commission (PAFBC), and the United States (U.S.) Fish and Wildlife Service (USFWS) throughout the entire Project planning process. Based on this coordination, a number of species of concern have been identified in the Project area and SPLP has conducted all surveys and developed conservation plans as required by the agencies. SPLP has received either a "no effect/impact" or a "not likely to adversely affect" determination on the Project from PADCNR, PGC, PAFBC, and USFWS. Attachment 6, Tab 6B of the Joint Permit Application (PNDI and Agency Coordination) provides a detailed summary of these agency consultations as well as all of the agency approved conservation plans. SPLP will adhere to all conditions provided within the final determination letters and associated conservation plans. Implementation of these Project Procedures was a significant consideration of the agencies in issuance of their final determinations.

The following correspondence and conservation plans are included in Attachment 6, Tab 6B:

- PADCNR Final Determination Letter; January 15, 2016
- PADCNR Conservation Plan for Identified Species of Special Concern; November 2015
- PGC Final Determination Letter; June 8, 2016
- PGC Eastern Small-footed Bat Conservation Plan; January 2016
- PGC Allegheny Woodrat Conservation Plan; May 2016
- PAFBC Final Determination Letter; September 22, 2015
- PAFBC Final Determination Letter; October 26, 2015
- PAFBC Timber Rattlesnake Conservation Plan; August 2015
- USFWS Final Determination Letter Rev 2; October 31, 2016
- USFWS Final Determination Letter Rev 1; September 15, 2016
- USFWS Final Determination Letter Rev 0; June 24, 2016
- USFWS Ground Water Approval; July 18, 2016
- USFWS Vibration Monitoring Plan Approval; October 26, 2016
- USFWS Bog Turtle Conservation Plan; April 2016
- USFWS Northeastern Bulrush Conservation Plan; September 2015
- USFWS Myotis Conservation Plan; April 2016
- USFWS Migratory Bird Habitat Conservation Plan; November 2016

A summary of the conditions found within those letters is provided in Appendix A.

6.0 GENERAL PROCEDURES

Many BMPs of various types will be implemented in accordance with the Project's E&S Plan to control, sedimentation and erosion during construction, thereby protecting nearby wetlands and waterbodies. These BMPs are listed in detail on E&S Plan Sheets ES-0.01 through ES-0.22 that are provided in Appendix B.

7.0 TEMPORARY EQUIPMENT CROSSINGS

SPLP has developed the following procedures for the temporary crossings of wetlands and streams. These procedures identify measures SPLP will implement during construction to avoid, minimize, and ensure minor and short-term impacts to wetland and streams. As soon as the temporary crossing is no longer needed, the temporary crossing shall be removed and all materials shall be disposed of properly. However, temporary bridges will not remain in place for more than 1 year from the installation date. Disturbed areas will be stabilized as indicated in Section 8.3 and Section 9.3 and restored to pre-construction conditions, as set forth in the E&S Plans.

7.1 Timing Restrictions

Certain waterbodies shall be restricted from in-stream work in accordance with coordination with the PAFBC. Attachment 6, Tab 6C provides a copy of these correspondences. All of the most current trout stream restrictions assembled directly from these correspondences are noted on the E&S Plans and aerial site plans located in Attachment 7, Tab 7A. In accordance with this coordination, temporary bridges with disturbances below the ordinary high water mark may be constructed, left in place, and used during the restricted period, subject to the bridge being installed prior to the restriction period and removed after the restriction period. This includes the allowance for installation of in-stream bridge supports. Equipment bridges installed in a manner limiting the disturbance to above the ordinary high water mark can be installed, used, and removed during the restriction period, however installation and removal is preferred to be conducted outside of the restriction period. See Sections 8.1 and 9.1 for further information regarding timing restrictions.

7.2 Temporary Crossing Methods

SPLP will utilize one of the temporary equipment bridge types listed below to facilitate the crossing of streams and wetlands with vehicles, equipment, and haul trucks.

Timber Equipment Bridge – A temporary bridge assembled of timber mats or rail car spans. Typically used for minor and medium stream crossings. See E&S Plan standard typical drawing for details.

Some features of a timber equipment bridge are as follows:

- Ensure runoff from the travel lanes is diverted off the travel lane into a sediment removal BMP before it reaches the stabilized approach.
- Geotextile shall be woven with a minimum are tensile strength of 200 pounds (Minimum Average Roll Value [MARV]). Alternates must be approved by the Engineer. Where safety is a concern, geotextile may be removed with prior approval from the Engineer.

Culvert Bridge – A temporary bridge installed with the use of culverts. Rock fill is used to form the road surface, which may be covered with timber mats. Utilized at medium and large stream crossings. See E&S Plan (Appendix B) standard typical detail drawing for details.

- Waterbars and broad-based dips shall discharge to 18 inch compost filter sock (cfs) or approved sediment removal facility.
- Clean rock shall conform to Chapter 105 permitting requirements.
- Follow permit conditions regarding removal of crossing.
- Alternatively, timber mats may be used to form the travel surface.
- Provide 50 feet of stabilized access to crossing on both sides of stream channel (see plan view in E&S Plan, Appendix B). The stabilized approach may consist of gravel (AASHTO [American Association of State Highway and Transportation Officials] #1 or equal) or timber mats.
- Pipes shall extend beyond the toe of the crossing support.
- Runoff from the roadway shall be diverted off the roadway and into a sediment removal BMPs before it reaches the rock approach to the crossing.
- Follow trout stream restrictions shown on the E&S Plan sheets (see Appendix B).
- Multiple pipes and multiple span bridges and culverts which may tend to collect debris, contribute to the formation of ice jams, and increase head losses shall be avoided to the maximum extent practicable. Crossings of less than 15 feet shall be constructed with one span, except where conditions make it impractical to affect the crossing without multiple spans (Section 105.162).
- Refer to PADEP Erosion and Sediment (E&S) Manual page 39 and 40 for Details #3-13 (single span culvert) and #3-14 (multiple span outlet) for additional information.

Timber Mat – Timber mats will also be utilized when staging areas or additional workspace is required within wetlands. See E&S Plan (Appendix B) standard typical detail drawing for details.

- Post signs, “No Fueling within 100’ of Wetland Boundary”.
- All controls will be installed after initial ground disturbance and maintained until all areas are stabilized.
- Limit stump removal to trench line, unless other stumps cause an unsafe condition.
- Restore to original contour and drainage. Restore wetland material.
- Restore wetland in accordance with Sheet Plan ES-0.15.

8.0 WATERBODIES – OPEN TRENCH

SPLP has developed these Project Procedures to implement during construction to avoid, minimize, and ensure only minor and short-term impacts to streams during construction. SPLP will also utilize trenchless construction methods consisting of conventional bore and HDD to accomplish the installation of the pipeline at several waterbody crossings. HDD installation is discussed in Section 10.0 of these Procedures.

8.1 Timing Restrictions

SPLP will generally complete in-stream work in minor waterbodies (<10 feet wide) within 24 hours, and in major waterbodies (10 to 100 feet wide) within 48 hours. These timeframes will not be affected by hydrostatic testing, since the trenches do not remain open during hydrostatic testing. Backfilling of trenches and completion of construction in waterbodies will occur per the timeframes indicated and well in advance of hydrostatic testing which occurs once the mainline

pipeline per spread is completely installed in one contiguous linear segment (i.e., in ground, backfilled to adjacent grade). The time of year of in-stream work at waterbody crossings shall be restricted in accordance with correspondences with the PAFBC. Attachment 6, Tab 6C provides these correspondences. All of the most current trout stream restrictions assembled directly from these correspondences are noted on the E&S Plans (Appendix B) and aerial site plans located in Attachment 7, Tab 7A.

In accordance with these correspondences, temporary bridges with disturbances below the ordinary high water mark may be constructed, left in place, and used during the restriction period, if the bridge is installed prior to the restriction period and removed after the restriction period. This includes the installation of in-stream bridge supports. Equipment bridges installed with limiting the disturbance to above the ordinary high water mark can be installed, used, and removed during the restriction period, however installation and removal is preferred to be conducted outside of the restriction period.

As noted within Attachment A for the eastern redbelly turtle, no in-stream construction at Stream H52 near Wetland Q75 is to occur during the over-wintering period of the redbelly turtle (October 15 to April 15).

The durations of the stream crossings are indicated within the E&S Plan notes/details (see Appendix B). Where the dam and pump dry crossing method is used, SPLP will assess each stream prior to crossing and select a sufficient number/size capacity of pumps, including on-site backup pumps, to continuously maintain downstream flows during the crossing. SPLP will generally complete in-stream work in minor waterbodies (10 feet in bottom width or less) within 24 hours, and in larger waterbodies (between 10 feet and 100 feet in bottom width) within 48 hours, including completion of stream restoration. The seasonal timing of in-stream crossings will comply with the agency-prescribed allowable timeframes designed to minimize impacts to coldwater fisheries. Pump intakes will be screened to minimize entrainment of fish and other aquatic life. The dam and pumps will be continuously monitored to ensure proper operation throughout the waterbody crossing. As noted above, the duration of the dam and pumps will be limited to 24 or 48 hours.

SPLP has limited use of the proposed flume option on several larger streams because the HDD method will instead be used to avoid direct impacts to the streams. For other larger streams, the Dry Crossing method includes the option to use dry dam and flume, dry dam and pump, or other method which conveys stream flow around the in-stream workspace for a relatively dry trenched work area (such as a coffer dam); therefore, a flume option is indeed an available larger stream crossing option.

For all EV wetlands and streams, SPLP will install the second pipeline immediately following the installation of the first pipeline, as long as no unanticipated, extraneous circumstances or safety issues are encountered.

8.2 Dry-Crossing Construction Methods

Dry stream crossing methods involve in-stream excavation and continuous water flow in the stream, but construction techniques allow the water to be isolated and conveyed cleanly downstream, either through or around the construction area. Dry crossing methods include the Pump Bypass, Flume, Cofferdam, or Dry Open-cut crossing methods. Selection of which dry method will be used will be determined in the field at the time of crossing, by the Contractor and SPLP's Environmental Inspector as conditioned below. The method selected will be the method that is best suited to the physical stream conditions, provides the least disturbance, and ensures the most expedient crossing to minimize overall impact.

SPLP shall protect and minimize potential adverse impacts to waterbodies by:

- A utility line crossing of a stream channel 10 feet in bottom width or less shall generally be completed within 24 hours from the start to finish including trench backfill, stabilization of stream banks and stabilization of the area 50 feet back from the top of each stream bank.
- A utility line crossing of a stream channel between 10 feet and 100 feet in bottom width shall be completed within 48 hours from start to finish including trench backfill, stabilization of stream banks and stabilization of the area 50 feet back from the top of each stream bank.
- Facilities for removing sediment from pumped water should be available at the stream crossing site before trenching commences and maintained until trench backfilling is completed. Assembly areas, temporary equipment and non-hazardous material storage areas shall be located at least 50 feet back from the top of any bank.
- Install temporary equipment crossings at streams and temporary timber mats at wetland crossings in accordance with notes and details.
- For dry stream crossings, install pump bypass, dry flume or cofferdam in accordance with notes and details.
- Water from the excavation shall be pumped to a sediment filter bag. Where possible, excavation shall be conducted from the top of the stream bank.
- Stabilize channel excavation and stream banks prior to redirecting stream flow in the stream.

8.2.1 Pump Bypass Method

A dam and pump crossing involves construction of a dam on the upstream end of the trench work area, from which a pump and pipe or hose are used to convey stream flow around the work area and discharge the water downstream of the work area. Similar to the flumed crossing method, the dam and pump allows for a dry trench workspace area, but is often used in streams with curved or meandering channels where effective placement of a straight flume pipe is not feasible.

- See the E&S Plan (Appendix B) sheets for floodway and floodplain locations and for reference to site-specific stream crossing drawings.
- Construct waterbody crossings as perpendicular to the axis of the waterbody channel as engineering and routing conditions allow.
- The pump should have twice the pumping capacity of the anticipated flow.

- Contractor shall ensure that a sufficient number of backup pumps are available at the site to maintain twice the pumping capacity of anticipated flow.
- Install upstream dam and then downstream dam. Keep pump running to maintain stream flow (see Detail 13 ES-0.07).
- Bypass pump intakes shall be screened and maintained a sufficient distance from the stream bottom to prevent pumping of channel bottom materials and aquatic life.
- An energy dissipater is required at the discharge of the bypass pumps.
- Waterbars shall be placed 50 feet from top of bank except as noted on E&S Plan (Appendix B) site-specific plan drawings.
- Mark the top of streambank with highly visible flagging and post "Protected Resource" and "No Refueling" signs within 100 feet of top of streambank.
- Material storage areas shall be located at least 100 feet back from top of streambank.
- Grubbing shall not take place within 50 feet of top of bank prior to stream installation with the exception of the travel lane until all materials required to complete crossing are on site and pipe is ready for installation.
- Construct dams with sand bags, jersey barriers, or similar material with an impervious liner extended to the stream bottom and secured with sandbags (ES-0.07 of the E&S Plan; Appendix B).
- Natural stream bed material will be stripped and segregated from subsurface material for final stream bed restoration. Excavation portion of native stream beds comprised of rock, cobble or gravel are to stripped and segregated and used during stream restoration.
- Restore stream channels and bottoms to their preconstruction contours or better, and stabilizing channel prior to re-establishing flow.
- All excess excavated material shall be removed from the stream floodway prior to permanently stabilizing stream banks:
- All disturbed areas within 50 feet of top of bank and 100 feet in special protection watersheds should be blanketed or matted within 24 hours of initial disturbance for minor streams or 48 hours of initial disturbance for major streams unless otherwise authorized. Appropriate stream bank protection shall be provided within the channel.
- Remove all construction material and structures from the waterbody after pipeline installation.
- Natural stream bed material will be stripped and segregated from subsurface material for final stream bed restoration. Excavation portion of native stream beds comprised of rock, cobble or gravel are to stripped and segregated and used during stream restoration.
- Keep lime and fertilizers out of the stream.

8.2.2 Dry Flume Method

A flumed crossing involves collecting and directing the stream flow through a culvert or flume across the trench line work area. This allows for the trenching, pipe installation, and initial restoration to occur in dry conditions, underneath the flume set-up, while maintaining continuous downstream flow.

- See the appropriate E&S Plan sheets for floodway and floodplain locations and for reference to site-specific stream crossing drawings.
- The flume should be of sufficient size to convey normal stream flow over the open trench (minimum size 12 inches).
- Flume pipe must be one continuous pipe long enough to account for the possibility of the trench widening unexpectedly during the excavation (due to sloughing).
- Flume shall be installed prior to trench excavation at that location.
- An effective seal must be created around the flume(s). Once in place, the flumes are not to be removed until the pipeline has been installed and the stream bed and banks have been restored.
- Waterbars are to be placed 50 feet from top of bank except as noted on E&S Plan (Appendix B) site-specific plan drawings.
- Mark the top of the streambank with high visible flagging and post "Protected Resource" and "No Refueling" signs within 100 feet of top of streambank.
- Material storage areas shall be located at least 100 feet back from top of streambank.
- Grubbing shall not take place within 50 feet of top of bank prior to stream installation with the exception of the travel lane until all materials required to complete crossing are on site and pipe is ready for installation.
- Construct dams with sand bags, jersey barriers, or similar materials with an impervious liner extended to the stream bottom and secured with sandbags (See ES-0.07 of the E&S Plan; Appendix B).
- Natural stream bed material will be stripped and segregated from subsurface material for final stream bed restoration. Excavation portion of native stream beds comprised of rock, cobble, or gravel are to be stripped and segregated and used during stream restoration.
- Restore stream channels and bottoms to their preconstruction contours or better, and stabilizing the stream channel prior to re-establishing flow.
- All excess excavated material shall be removed from the stream floodway prior to permanently stabilizing stream banks.
- All disturbed areas within 50 feet of top of bank and 100 feet in special protection watersheds should be blanketed or matted within 24 hours of initial disturbance for minor streams or 48 hours of initial disturbance for major streams unless otherwise authorized. Appropriate stream bank protection shall be provided within the channel.
- Remove all construction material and structures from the waterbody after pipeline installation.
- Keep lime and fertilizers out of the stream.

8.2.3 Cofferdam Method

This method involves the installation of a cofferdam to isolate and divert flow around the work area in two phases and is typically completed on larger streams. The first phase consists of the cofferdam installation on one of the banks and approximately two thirds into the river to allow safe and dry installation of the pipeline across the river. The second phase involves the same process but from the opposite bank. The two phased approach necessitated by this method

requires an extended in-stream work window beyond the recommended PADEP completion timeframes of 48 hours for major streams.

- See the E&S Plan sheets for floodway and floodplain locations and for reference to site-specific stream crossing drawings.
- Waterbars are to be placed 50 feet from top of bank except as noted on site-specific E&S Plan drawings.
- Mark the top of the streambank with high visible flagging and post “Protected Resource” and “No Refueling” signs within 100 feet of top of streambank.
- Material storage areas shall be located at least 100 feet back from top of streambank.
- Grubbing shall not take place within 50 feet of top of bank prior to stream installation with the exception of the travel lane until all materials required to complete crossing are on site and pipe is ready for installation.
- Maintain adequate in-stream passage of water (minimum 1/3 the distance of the crossings) at all times to convey normal stream flow without creating accelerated bank erosion.
- Prepare stream bed for construction of cofferdam by removing large boulders and other objects that may prevent an adequate dam seal. Segregate stream bed material for restoration of stream bed following construction.
- Construct dams with sand bags, jersey barriers, or similar materials with an impervious liner extended to the stream bottom and secured with sandbags (See ES-0.07 of the E&S Plan; Appendix B).
- Draw down water within cofferdam structure and pump into waterbody.
- Prepare small trench or berm around the interior of cofferdam and locate sump as depicted for continuous pumping of any additional water infiltration into cofferdam structure space and trench. Continued pumping during construction activities shall be directed to a dewatering structure.
- Install timber mats along construction travel lane, if required.
- Natural stream bed material will be stripped and segregated from subsurface material for final stream bed restoration. Excavation portion of native stream beds comprised of rock, cobble, or gravel are to be stripped and segregated and used during stream restoration.
- Excavate the pipeline trench as necessary.
- Dewater trench to ensure that it is suitable for worker entrance to complete a tie-in weld should the trench fail and prove to be unsafe for workers. Discuss options with agencies.
- Install crossing pipe and sandbags or prefabricated concrete wall adjacent to the weld cap which will form a barrier to prevent movement of re-installed trench spoil while the east side of the crossing is constructed.
- Return trench spoil to trench and cover pipeline. Restore river bed with segregated river bed sediment and rock material.
- Slowly pump river water into cofferdam structure and allow all sedimentation to settle.
- Disassemble cofferdam structure.
- Restore river bank preconstruction contours to a stable angle of repose. Repeat steps on opposite side of waterbody.

- Restore stream channels and bottoms to their preconstruction contours or better, and stabilizing the stream channel prior to re-establishing flow.
- All excess excavated material shall be removed from the stream floodway prior to permanently stabilizing stream banks.
- All disturbed areas within 50 feet of top of bank and 100 feet in special protection watersheds should be blanketed or matted within 24 hours of initial disturbance for minor streams or 48 hours of initial disturbance for major streams unless otherwise authorized. Appropriate stream bank protection shall be provided within the channel.
- Remove all construction material and structures from the waterbody after pipeline installation.
- Keep lime and fertilizers out of the stream.

8.2.4 Dry Open-Cut Method

Crossing of waterbodies when they are dry and not flowing may proceed without the installation of a dam and bypass provided that the EI verifies that water is unlikely to flow in the stream bed between initial disturbance and final stabilization of the feature. This method is therefore most suitable for ephemeral streams which are only seasonally wet.

- See the E&S Plan sheets for floodway and floodplain locations and for reference to site-specific stream crossing drawings.
- Crossing of waterbodies when they are dry and not flowing may proceed without use of the dry sump bypass or a dry flume provided that the Environmental Inspector verifies that water is unlikely to flow between initial disturbance and final stabilization of the feature.
- Work on the crossing must be continuous and once started, proceed to completion.
- In the event perceptible flow is anticipated, all of the requirements for a pump bypass or dry flume must be met.
- Equipment and supplies to implement dry pump bypass or dry flume crossing will be on-site in case stream flow occurs during implementation.
- Do not excavate trench in dry stream bed until the pipe segment is assembled and ready for lowering in. Trench dewatering shall use a filter bag wherever feasible. To avoid uncontrolled downstream sedimentation, limit length of time to complete and restore stream crossing to the minimum practicable, e.g., less than 24 hours. If flow and substrate conditions are such that use of this crossing method would result in significant uncontrolled sediment transport to downstream areas, use a dry pump bypass or dry flume method instead of open cut.
- Waterbars are to be placed 50 feet from top of bank except as noted on site-specific E&S Plan drawings.
- Mark the top of the streambank with high visible flagging and post “Protected Resource” and “No Refueling” signs within 100 feet of top of streambank.
- Material storage areas shall be located at least 100 feet back from top of streambank.
- Grubbing shall not take place within 50 feet of top of bank prior to stream installation with the exception of the travel lane until all materials required to complete crossing are on site and pipe is ready for installation.

- Construct dams with sand bags, jersey barriers, or similar materials with an impervious liner extended to the stream bottom and secured with sandbags (See ES-0.07 of the E&S Plan; Appendix B).
- Natural stream bed material shall be stripped and segregated from subsurface material for final stream bed restoration. Excavation portion of native stream beds comprised of rock, cobble, or gravel are to be stripped and segregated and used during stream restoration.
- Restore stream channels and bottoms to their preconstruction contours or better, and stabilizing the stream channel prior to re-establishing flow.
- All excess excavated material shall be removed from the stream floodway prior to permanently stabilizing stream banks.
- All disturbed areas within 50 feet of top of bank and 100 feet in special protection watersheds should be blanketed or matted within 24 hours of initial disturbance for minor streams or 48 hours of initial disturbance for major streams unless otherwise authorized. Appropriate stream bank protection shall be provided within the channel.
- Remove all construction material and structures from the waterbody after pipeline installation.
- Keep lime and fertilizers out of the stream.

8.3 Stream Restoration

Stream restoration activities are detailed in the various stream crossing methodologies indicated in Section 8.2 of these Procedures.

Native stream bed material will be separated from other spoil for reinstallation after restoration (see the E&S Plan provided in Attachment 12). An evaluation was completed for sheer stress of stream flow against restored native stream bed material. If the evaluation indicated that the stream will not be stable with native material, then rip rap will be used. Site specific waterbody crossing and restoration plans providing direction for the installation of rip rap at these streams are included within the E&S Plans provided in Attachment 12. In these cases where rip rap is used and the stream bed is composed of rock, cobble, or gravel, then the native stone will be used for the top six inches of rip rap. Every effort will be made to segregate the entire top layer of native stone in streams with less than six inches of native stone where rip rap is proposed.

Furthermore, stream restoration will involve the following:

- For open-cut crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing instream construction activities. For dry-ditch crossings, complete stream bed and bank stabilization before returning flow to the waterbody channel.
- Natural stream bed material shall be stripped and segregated from subsurface material for final stream bed restoration. Excavation portion of native stream beds comprised of rock, cobble, or gravel are to be stripped and segregated and used during stream restoration.
- Return waterbody banks to preconstruction contours or to a stable angle of repose as approved by the EI.
- Install erosion control fabric or a functional equivalent on waterbody banks at the time of final bank recontouring. Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat unless

the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices.

- Application of rip rap for bank stabilization must comply with site specific drawings included within the E&S Plan provided in Attachment 12. Rip rap will be used to the minimum extent necessary to stabilize the stream bank, which is typically no more than 12 inches above the normal flow depth often evidenced by a lack of vegetation or a strand line. Stream banks above this elevation will be stabilized with erosion control blanket and revegetated.
- Revegetate disturbed riparian areas with native species as set forth in the E&S Plan.
- If rip-rap is used, natural streambed material is to be restored throughout and overtop the rip-rap where feasible.
- Install a permanent slope breaker across the construction ROW at the base of slopes greater than 5 percent that are less than 50 feet from the waterbody, or as needed to prevent sediment transport into the waterbody. In addition, install sediment barriers as outlined in the E&S Plan (Appendix B).
- In some areas, with the approval of the EI, an earthen berm might be suitable as a sediment barrier adjacent to the waterbody.

Some stream banks might be atypical (e.g., vertical banks, low banks, eroding banks). In such circumstances, these stream banks will be graded to preconstruction contours or to a stable angle of repose as approved by the EI. Site-specific crossing and cross-sectional drawings have been provided in the E&S Plans and are to be followed and referenced to aid in the restoration of the existing contours.

9.0 WETLANDS-OPEN TRENCH

SPLP has developed these to implement during construction to avoid, minimize, and ensure minor and short-term impacts to wetlands. SPLP will also utilize trenchless construction methods consisting of conventional bore and HDD to accomplish the installation of the pipeline at several wetland crossings, which is discussed within Section 10.0. SPLP will expedite construction in and around wetlands by implementing the construction methods itemized within Section 9.2. The duration of construction in wetlands will vary depending on the length of the wetland, whether it will be tied in with an associated stream crossing (in which case the crossing duration will be the same as that stream crossing), or whether it will be constructed as part of the mainline construction process (in which case spoil will typically not be sidecast in wetlands for more than 30 days, in accordance with the standard USACE requirements), and other factors.

9.1 Timing Restrictions

There are no noted timing restriction window on crossing any of the wetland areas on the Project. However, for all EV wetlands and streams, SPLP will install the second pipeline immediately following the installation of the first pipeline, as long as no unanticipated, extraneous circumstances or safety issues are encountered.

9.2 Wetland Construction Method

The following is a list of construction methods generally applicable for all wetland crossings that will be open-cut:

- Mark the limits of the wetland with high visible flagging and post “Protected Resource” and “No Refueling” signs within 100 feet of wetlands.
- Place orange safety fence between the limit of disturbance (LOD) and adjacent wetlands.
- Stabilize wetland travel lane approaches.
- See site-specific details when noted on E&S Plan sheets.
- Material storage areas shall be located at least 100 feet away from the wetland edge.
- Attempt to use no more than two layers of timber mats to stabilize the construction ROW.
- Cut vegetation off at ground level leaving existing root systems in place and remove cut vegetation from the wetland for disposal.
- Limit pulling of tree stumps and grading activities to directly over the trench line unless safety concerns require the removal of stumps from the working-side of the construction ROW.
- Segregate the topsoil from the area disturbed by trenching in unsaturated wetlands.
- Install temporary timber mats along the travel lane. Equipment will work from the mats.
- Spread Professional Geologist will advise on maintaining the hydrology of adjacent areas through installation of drains/flumes and/or pumps if seeps essential to adjacent area hydrology are encountered.
- Segregate topsoil from the area disturbed by trenching in unsaturated wetlands.
- Assemble pipe in upland areas unless wetland is dry enough to adequately support skids and pipe.
- If streams are present implement dry crossing methods.
- Restoration activities within wetlands (See typical wetland restoration) shall begin immediately after backfilling, weather permitting.
- No soil amendments such as agricultural lime or fertilizer will be used within the wetland areas.
- Restore wetlands to the original contours and surface flow.
- Bulldozers will not be used for clearing. Trees and brush will be cut by hand at ground level by chain saws or low ground pressure equipment or with equipment that does not cause excessive rutting of topsoil or with equipment supported by mats (timber mats, high-density polyethylene [HDPE] composite or similar).
- The minimum clearing necessary to safely construct the pipeline will be done. Mats or pads may be placed over the top of existing vegetation, including shrubs, where possible.
- All cut timber and brush will be removed from the wetlands. Grindings will be removed as much as practical. Debris and stumps will not be buried.
- Contractors shall be required to install completed mat travel lane for pipeline construction during the time Contractor’s clearing crew (does not mean tree felling) is performing its work.
- Prior to grading, topographic elevations shall be recorded so that original contours can be achieved during restoration. Unnatural features and unstable grades shall be noted by the EI.

- Orange fencing, compost filter stock (CFS), and erosion control measures shall be installed prior to grading at all wetland crossings.
- Grading will be limited to the areas directly over the trench line except where topography requires additional grading for safety reasons. When grading is required, topsoil with the root mass will be stripped, segregated and returned as an even layer to all graded areas.
- Permanently stabilizing upland areas near wetlands shall occur as soon as possible after backfilling.
- Before and during trenching the Spread's Professional Geologist will be consulted in regards to the presence of groundwater confining layers (e.g., rock, clay, fragipan) and the presence of groundwater seeps and drains. Segregation of the confining layers is to be conducted and, if necessary and practicable to maintain the hydrology of adjacent areas, seeps and drains are to be temporarily flumed. Confining layer conditions are to be restored to the original condition to the maximum extent under guidance of the spread hydrogeologist.
- Erosion Control Blanket (ECB) shall be installed 50 feet from wetland edge in non-special protection waters and 100 feet in Special Protection waters.
- Waterbars are to be placed 50 feet from the top of bank except as noted on site specific plan drawings.
- Mark the top of streambank with high visible flagging and post resource and no refueling signs within 100 feet of top of streambank.
- Material storage areas shall be located at least 100 feet away from wetland edge.
- Any excess fill material must be removed and not spread within the wetland.

9.3 Wetland Restoration

- Backfill trench; where soils were segregated, replace in order of removal (consult Spread Professional Geologist prior to and during backfilling; see Section 4.0).
- At wetlands determined to require confining layer restoration, the spread Professional Geologist will be on-site during wetland backfilling to ensure proper soil layer restoration. The hydrogeologists will advise on bentonite sandbag layering along the entire or portions of the trench line at the appropriate height.
- Once backfilling is complete, remove temporary timber matting and all construction debris and restore original grades.
- Restoration activities shall begin immediately after backfilling. Temporarily revegetate all impacted wetlands in accordance with plan sheet ES-0.05 (Appendix B) to allow rapid stabilization and deter invasive species.
- Permanently revegetate impacted palustrine emergent (PEM) wetlands in accordance with plan sheet ES-0.05 (Appendix B) that calls for Ernst Conservation Seed Mix No. ERNMX-122 Facultative Wet (FACW) Meadow Mix. Plant during the recommended planting season.
- Temporary or permanent revegetation is not necessary in areas of standing water.
- No soil amendments, lime, fertilizer or binding agents are to be used in wetland areas.
- Impacted palustrine scrub-shrub (PSS) wetland areas where noted on plan sheets will be planted with shrub species in accordance with ES-0.05. Plant during the recommended planting season.
- Impacted PSS wetland areas where the root system was not removed (e.g., matted over) do not require replanting.

- Impacted palustrine forested (PFO) wetlands areas where noted on plan sheets for restoration will be planted with the tree species in accordance with ES-0.05.
- PSS and PFO restoration areas will be protected with “no-mow” signs or other restrictive barriers as determined by SPLP.
- Monitor all wetlands for successful restoration in accordance with Section 10.0.

PSS and PFO Restoration Area Details

To facilitate the re-establishment of PFO and PSS wetland communities, all or portions of the wooded areas that require clearing along the Project corridor within PFO and PSS wetlands will be replanted with native trees and shrubs. The figures in Appendix D provide the locations of the areas where PSS and PFO impacts occur across the entire Project. During restoration, temporary workspaces in PFO wetlands will be planted with native tree species and the permanent ROW will be planted no closer than 10 feet from the proposed or existing pipelines with native trees. The remainder of the PFO wetland area within the permanent ROW will be restored to the wetland condition; however it will result in permanent conversion of PFO to the PEM wetland classification. All temporarily impacted PSS wetlands will be replanted in both the temporary workspaces and permanent ROW with native wetland shrubs. The species composition of the replanting effort will consist of native shrub species similar to those present prior to construction. PSS impacted wetland areas where the root system was not removed (e.g., matted over) may not require replanting. The EI will determine which PSS areas were not impacted to the point where replanting would be necessary. Table 1 within Appendix D provides temporary workspace and permanent right-of-way impacts to both PFO and PSS wetlands for each county traversed by the Project.

The PSS temporary workspace and permanent ROW areas will be planted with tree/shrub species consisting of two to three-foot sized whips in a variety of FACW species. Forested wetland areas located in the temporary workspace and portions of the permanent ROW will be planted with containerized tree (approximately 1-inch diameter at breast height) species native to the area and commonly found in the local wetlands. No cultivars or other ornamental native-species will be allowed as substitutes.

Trees and shrubs will be planted at a density of at least 400 plants per acre in accordance with U.S. Army Corps of Engineers (USACE) recommendations. A list of tree and shrub species to be planted within the PFO and PSS restoration areas is provided in Table 2 of Appendix D. This list of tree and shrub species was generated based on information obtained during field surveys and from previous projects conducted throughout the region.

All planting activities will be performed by a qualified forester, arborist, or landscape contractor under the supervision of a qualified EI to provide oversight of the planting activities. Installation of the tree plantings will be conducted using foot traffic and hand tools to the extent practicable, to avoid unnecessary impacts to restored wetland areas as a result of planting activities. Where necessary, the landscape contractor shall use sheets of plywood or equivalent material for weight distribution along travel routes within saturated wetlands to protect soils from excessive rutting, compaction, or topsoil and subsoil mixing by foot traffic. Additionally, the number of required trips within wetlands will be limited to the minimum number of trips necessary to accomplish the task. SPLP will require the planting contractor to be responsible for restoring all areas temporarily damaged during the planting process including, but not limited to, soil rutting, soil compaction, vegetation disturbance, damage to water bars/slope breakers, and other impacts to the ROW and access roads caused during the planting activities.

To the extent possible, tree and shrub species will be mixed and randomly planted within the wetland to mimic natural regeneration and provide diversity in the planted areas. In rocky areas, or any area with conditions that are considered unsatisfactory for planting (i.e., loose mounds of soil, rotten wood, clumps of dead vegetation, abnormal depressions), the planting spacing will be adapted to best suit the conditions. Species will be planted in areas suited for their specific growing requirement (i.e., species favoring wetter/drier areas will be planted as such).

A 2-foot tall or larger tree tube will be placed over the planted tree seedlings to protect them from predation. A minimum 1-inch by 1-inch by 3-foot oak stake will be placed in the ground, parallel to the tree tube, and secured to the tube in at least two (2) locations. Each shrub planting will be fenced using a section of galvanized fencing that stands a minimum of 48 inches in height. The fencing will be secured using two (2) 3-foot oak stakes set at 180 degrees (°) from each other. The fencing will be secured to the oak stakes with metal wire.

To ensure successful completion and increased survivorship of individual plantings, SPLP anticipates planting in either the fall immediately following completion of the Project construction, or during the following year. If actual construction completion timeframes do not accommodate a fall planting schedule, then SPLP will conduct the plantings as soon as recommended and practicable during the following growing season. The timing of planting will be in accordance with guidance and recommendations from the qualified forester, arborist, or landscape contractor depending on the plant species and/or locations. In general, plantings installed in March, April, and May benefit from rains and the long growing season to come. But often, too much precipitation makes planting difficult, especially on poorly drained sites. Also, the quick onset of hot, dry weather that may displace a short spring season can negatively affect new young plantings. Due to these difficulties, fall planting is favored. Ideally, planting would be done from mid-August to mid-October, a period of generally moderate and relatively stable air temperatures, with soil temperatures and moisture levels usually in a range that promote rapid root development.

Maintenance of these planted areas will focus on avoiding accidental mowing during routine ROW vegetation maintenance. To protect the plantings from accidental mowing by SPLP's maintenance crew and others, SPLP will install "No Mow Zone" markers at the entry and exit points, and along the edge of the planted areas along the pipeline's permanent ROW. This will demarcate the tree planting/growing area and signal the mowers to avoid mowing in these areas. Please see Section 11.0 for the Post-Construction Monitoring and reporting for the PSS and PFO restoration areas.

10.0 TRENCHLESS CONSTRUCTION METHODS

SPLP will utilize trenchless construction methods consisting of conventional bore and HDD to accomplish the installation of the pipeline at several wetland and waterbody crossings. Trenchless construction methods allow minimal disturbance to the ground surface along the drill path. The type and extent of disturbance that will occur along the drill path for the trenchless construction methods will be limited to use as a travel lane, placement of tracking wires to aid in steering bores and foot patrols to monitor for inadvertent release indicators as stated within the IR Plan located within Attachment 12.

Use of trenchless construction methods would generally not be time-restricted like other stream crossings, since it involves no work within or impact to the stream bed, stream banks, or water quality.

10.1 Horizontal Directional Drilling (HDD)

HDD technology involves the drilling of a bore hole through an underground pathway that facilitates the subsurface installation of a section of pipeline. HDD crossing technology is utilized for a variety of purposes, including but not limited to avoidance of surface impacts to sensitive resources such as streams and wetlands, avoidance of impacts to major roadways and infrastructure, and reduction of impacts to residential areas. Standard typical details for HDD entry and exit points are provided within the E&S Plan (Appendix B) and HDD plan and profile drawings provided within Attachment 7B.

HDDs involve the use of drilling fluid to lubricate the drill heads for pilot hole drilling, reaming, and pipe pullback activities. Prevention of the release of drilling fluids from the confines of the bore hole are discussed within the Project's IR Plan. The Project's IR Plan discusses the preconstruction activities, such as geotechnical borings, lessons learned, and risk assessments that have been used in preparation of the final design of the HDD. The IR Plan also addresses the preparedness and contingencies measures for inadvertent releases.

In an HDD, a specialized drill rig is used to advance an angled drill head along a trajectory using a telemetry guidance system that provides accurate "steering" of the drill head in accordance with the drill plan. The telemetry guidance system requires a 4-6 gauge wire to be strung along the HDD alignment to allow for accurate drill head tracking. SPLP has identified those crossings that require (ATON) Plans through consultations with PAFBC. SPLP has prepared and has received approval from the PAFBC of the ATON plans for the stringing of the telemetry wire for those water crossings with potential for recreational or commercial navigation. ATON plans and the PAFBC approval are provided in Attachment 7, Tab 7B.

- Review IR Plan and project PPC Plan ahead of construction activities, notifications, and conditions. Make all appropriate notifications. Implement these plans during construction.
- Review HDD for written ATON plans and implement if telemetry wire is to be used for tracking.
- See site plans for E&S controls.
- Layout will vary according to available work space and field conditions.
- Grade and topsoil workspaces where necessary to make workspace available for parking, staging, and other uses when not being used for boring.
- HDD beneath wetland and waterbodies where indicated on E&S Plan sheet. See site-specific drawings as noted.
- Temporary waterbars shall be installed after clearing and prior to temporary grading if needed for HDD installation.
- Permanent waterbar shall be installed after clearing and prior to temporary grading if needed for HDD installation and reinstalled once final grading established.
- Telemetry wire will be strung from entry to exit points. Install compost filter socks/silt fence along the down gradient perimeters of the HDD bore pit.
- Excavation of the drill entry and exit locations will be necessary to contain drilling fluids during all phases of installation. These fluids and cuttings must be disposed of in an approved manner periodically or at the complete crossing installation (see IR Plan for details).
- The crossing length and cross sectional geometry is dependent upon the pipeline design parameters, the obstacle crossed and the subsurface conditions.

- Install temporary wetland matting when HDD workspaces are located in wetlands. Durations will vary depending on HDD size and progress but should be removed as soon as the staging workspaces is no longer needed.

10.2 Conventional Bore

Conventional bores are used primarily at roadways and other features such as wetlands and streams to avoid surface impacts. Excavation of bore pits at a planned distance apart allows for the drilling of the hole underneath the feature and subsequent insertion of the section of pipe. Similar to the HDD method, a conventional bore would generally follow the steps outlined above, with the exception of steps related to drilling fluid. Standard typical details for conventional bores and site-specific bore drawings where determined necessary are provided within the E&S Plan (Appendix B).

- Layout will vary according to available work space and field conditions.
- Workspace will be available for parking, staging, and other uses when not being used for boring.
- Install compost filter socks/silt fence along the downgradient perimeters of the bore pits. See site plans for E&S controls.
- Excavate bore pits in accordance with site-specific plans and segregate top soil in accordance with standard E&SC plan notes. Position bore pits a minimum of 50 feet from the nearest top of bank, where technically feasible.
- Install temporary wetland matting when bore workspaces are located in wetlands. Durations will vary depending on bore size and progress, but are to be removed as soon as the staging workspaces is no longer needed.

11.0 POST-CONSTRUCTION MONITORING

The Project area that will be temporarily impacted will be restored to original grade, stabilized, and vegetated in accordance with the E&S Plan (Attachment 12). SPLP is responsible for maintaining the ROW under the provisions of their Chapter 102 permits. Post-construction maintenance of the ROW will include periodic visual inspections to identify the progress of vegetative growth and cover. Insufficient vegetative cover is defined in upland areas as any area not achieving a uniform 70-percent perennial vegetative cover. Bare spots and areas with insufficient vegetative cover will be reseeded and mulched within 24 hours of observation, weather permitting. The ROW will be inspected for signs of erosion, especially on steep slopes, and corrective measures will be taken to eliminate erosion, as needed. If there is evidence of trench settling, the area will be regraded to maintain pre-construction drainage patterns, mulched, and seeded. A written report will be prepared to document each E&S inspection and for each repair or maintenance activity.

The following summary of criteria is set forth to describe the post-construction monitoring of wetlands and streams.

All restored wetland areas will be monitored post-construction by a qualified wetland specialist and in accordance with the terms of the applicable permits. PADEP's guidance document entitled "Design Criteria - Wetlands Replacement/Monitoring" describes a program that requires wetland monitoring twice a year for the first two years (Years 1 & 2) and once a year for the following 3 years (Years 3-5) during the growing season. The wetland inspections will assess the success of the wetland restoration based on the following criteria:

- At least 50% coverage of emergent species, excluding invasive species (which are not to exceed the percent cover found in adjacent wetlands) by the end of the first growing season, and
- At least 85% coverage of emergent species for all additional years for a minimum of 5 years.
- Invasive species will be monitored and noted for remedial action, where necessary to meet success criteria.

Hydrology will be evaluated during each inspection to ensure that the hydrologic regimes are similar to the preconstruction and adjacent area conditions. Changes in hydrology will be evidenced by significant changes in plant species composition, the prolonged presence of standing water in areas not previously inundated, or the lack of inundation where standing water was previously present. The soil morphology in undisturbed areas of the wetland (i.e., cleared but not excavated) will be monitored for significant changes to hydric soil indicators, including but not limited to, a significant change in the relative percentage of redox concentrations in the form of iron-manganese soft masses and/or pore linings, observations of water levels within the soil pit, positive reaction to application of "a,a'-dipyridyl" dye in the upper part of the soil (e.g., 12 inches), and/or the presence of oxidized rhizospheres associated with living plant roots. Adjacent area conditions will also be noted to determine if the hydrologic regime of the surrounding area is changing.

During monitoring, SPLP will also make note of any wetlands where issues such as landowner disturbance (i.e., ATV use), natural impacts (i.e., excessive deer browse, insect infestation), and/or loss of signage are observed. SPLP will recommend corrective actions for these issues on a case-by-case basis by working with PADEP/USACE and landowners to achieve the success criteria.

All stream crossings which were not subjected to trenchless construction will also be monitored in accordance with the terms of the applicable permits.

Following each inspection, SPLP will prepare a monitoring report that will:

- Identify the success of the restoration;
- Provide photographs of the areas with figures showing the location and orientation of each photograph;
- Summarize deficiencies or problems identified during the monitoring period;
- Outline any proposed corrective actions and schedules for implementation; and
- Present the results of prior corrective actions.

After the first full growing season, SPLP's monitoring report will include an assessment regarding the overall success of the restored wetlands. Specifically, if the wetland areas are not exhibiting signs of successful revegetation, the overall seeding/planting program will be reevaluated to determine if additional on-site measures are warranted in these areas. The results of this detailed assessment will be presented in the Year 1 monitoring report and coordinated with the appropriate regulatory agencies, to develop and implement adaptive management strategies.

12.0 HYDROSTATIC TESTING

Hydrostatic testing involves filling a pipeline segment with water and performing a pressure test. SPLP utilizes hydrostatic tests for a variety of applications, such as strength testing prior to commissioning a newly constructed pipeline, testing pipeline replacement sections before being tied into the main pipeline, as a periodic pipeline reassessment method after a pipeline has been in operation, or to establish a new maximum operating pressure. The hydrostatic tests are used to ensure that the pipeline is suitable for service prior to commissioning.

A combination of approved surface water sources (SWSs) and public water sources (PWSs) will be used to provide the water required for, hydrostatic testing of pipeline segments. The pipeline will be tested hydrostatically in accordance with Department of Transportation (DOT) regulations, 49 Code of Federal Regulations (C.F.R.) Part 195. The pipeline will be filled with water and maintained at a test pressure and duration in compliance with SPLP's engineering standards and applicable federal regulations. After completion of a satisfactory test, the water will be discharged to the ground in accordance with the E&S Plan (Appendix B) and previously obtained discharge permits, or trucked to an offsite facility. HDD segments will be hydrostatically tested individually after the installation process. Subsequently, once the entire pipeline has been installed within a construction spread, the full pipeline will be hydrostatically tested. The following BMPs are to be followed:

- Notice of Intent must be submitted and PAG-10 permit coverage received prior to discharging hydrostatic test water. A PPC Plan for this activity will be developed in conjunction with this permit issuance process.
- Hydrostatic test water discharge structure will be located within the project ROW or other established ROW approved by SPLP and landowner. Increase size of discharge structure and number of filter bags to match required discharge rate and total suspended solids (TSS) removal, as long as required land is available. Add additional smaller discharge structures if space is limited. Eliminate filter bag(s) if TSS removal not required and replace with T-baffle/splash plate.
- Hydrostatic test water discharge structure will be located at least 100 feet from the edge of a delineated wetland, and 50 feet or the channel width, whichever is greater, from the top of bank of a receiving stream.
- Hydrostatic test water discharge structure will be located such that it drains to a well-vegetated area with slopes between 1 percent and 5 percent toward the receiving waterbody.
- Hydrostatic test water must be sampled and analyzed to confirm compliance with parameters identified in PADEP Pennsylvania General Permit (PAG)-10 for Discharge from Hydrostatic Testing of Tanks and Pipelines and the Approved Sampling and Analysis Program for Hydrostatic Test Waters for PPP in Pennsylvania.
- The discharge rate to the structure should be limited to the lowest possible rate to minimize any potential impact on aquatic life and to reduce the potential for erosion (e.g., 150 gallons per minute [gpm]).
- If municipal water is used for testing, hold water in the pipe for at least 24 hours prior to discharge to meet total residual chlorine limits.
- Implement additional erosion and sediment controls as required in PADEP E&SC Program Manual, Technical Guidance Number 363-2134-008, March 2012.
- Do not discharge hydrostatic test water to exceptional value (EV) or high quality (HQ) waters.
- Do not discharge hydrostatic test water to trout stocked streams from March 1 to June 15. Trout stocked streams crossed by the project are identified on the E&S

Plans provided in Attachment 12. The listing of trout stocked streams can also be found on the PAFBC website: www.fish.state.pa.us.

13.0 COMPENSATORY MITIGATION PLAN

For unavoidable permanent impacts to wetland resources, a Compensatory Mitigation Plan has been developed and is provided in Attachment 11, Enclosure F of the Project's Chapter 105 Joint Permit Application.

14.0 OPERATION AND MAINTENANCE

SPLP's Operation and Maintenance (O&M) practices are aimed at preventing emergencies on the pipeline while allowing delivery of the NGLs to its customers. To ensure safe delivery, SPLP designates an O&M Program team to manage the inspection and testing of the facilities and associated controls for proper working order. The O&M Program is extensive and has been developed through decades of experience with pipeline facility operation. The O&M Program consistently assesses and updates its maintenance guidelines to ensure compliance with all appropriate standards.

In general, pipeline facility O&M activities are restricted to non-intrusive, non-land disturbing activities. Facility inspections are carried out on foot, by utility vehicles, and/or by aerial inspection. Testing is often conducted and restricted to the confines of the aboveground facilities. Other O&M activities include maintenance of the Permanent ROW to maximize an open condition to allow for aerial and foot-inspection and safe access in case of emergencies. This includes maintenance of permanent access roads, markings, controlled entryways, gates, and fencing. Periodic hydrostatic testing may also occur as part of an O&M procedure.

Permanent ROW maintenance clearing promotes the safe and efficient operation of the pipeline by enabling SPLP to meet its complementary objectives of protecting the integrity of the pipeline, effectively responding to emergency situations, and increasing community awareness of the presence the pipeline. Clearing of tree growth located near the pipeline is necessary because roots from trees can wrap around the pipeline and damage its protective coating, causing pipeline corrosion. Tree root systems are drawn to the warmth and moisture of pipelines and often abnormal and excessive root growth patterns are experienced near pipelines. Where pipelines are deep enough, such as sections that have been crossed by an HDD, clearing of trees is not as necessary. A clear permanent ROW also provides a visual marker that alerts the public to the pipeline's presence and helps prevent unauthorized excavation and development within the right-of-way. Third-party "hits" are the number one cause of pipeline damage in the U.S.

Maintenance of vegetation along the ROW is monitored and carried out as needed to ensure the integrity of the pipeline is not compromised by tree growth, or vegetation does not impede access in-case of emergencies and does not obstruct a clear view of the ROW during regular aerial patrols. Maintenance of the vegetation will be via mowing and periodic tree trimming within upland areas at regular intervals. In some areas where special agreements with the landowner, or where permit conditions/mitigation commitments have been made, vegetation maintenance may be restricted or limited (e.g., permanent easement areas). Additionally, no mowing, hand-clearing, or herbicide application will occur in wetlands.

The O&M Program may identify the need to repair a section of pipeline that would result in land disturbance. This along with any hydrostatic testing that would occur during O&M would only be conducted after all appropriate local, state, and federal permits and authorizations are obtained.

APPENDIX A

PNDI CONDITION LISTING

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The following is listing of the conditions that SPLP has agreed to implement during pre-construction, construction and restoration, and post-construction activities drawn from final determination letters received from the four PNDI agencies; the PAFBC, PGC, USFWS, and DCNR and the final conservations plans approved by those agencies. The final determination letters and conservation plans located in Attachment 6 of the Project's Chapter 105 Joint Application for Permit is to be referenced at all times for these conditions and specific locations to ensure implementation of all agreed to actions.

Species or Area	Agency	Water	County/AOC/ Survey Area	Population	Pre-Construction, Construction and Restoration, Post-Construction Activity	Clearance Letter	Conservation Plan	Primary Condition
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Construction mitigation measures include timing restrictions, construction Bumps, and monitoring and relocation procedures [Timber Rattlesnake Conservation Plan § 3.2]; Note: No construction timing restrictions are necessary due to the avoidance of den habitats and commitment to providing timber rattlesnake monitors during construction activities [Timber Rattlesnake Conservation Plan § 3.2.1]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Construction in close proximity to the five confirmed den locations that were avoided will occur at any time, but these areas will be monitored closely during the emergence period (April 15 to May 15) and the return period (September 1 to October 15) [Timber Rattlesnake Conservation Plan §3.2.1]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Within 19 areas identified in Figures 2-30 (Timber Rattlesnake Conservation Plan), erosion control fabric made of materials known to reduce the risk of snake entrapment will be selected [Timber Rattlesnake Conservation Plan § 3.2.2]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	During restoration and seeding, monofilament/plastic netting will be avoided within 19 areas identified in Figures 2-30 (Timber Rattlesnake Conservation Plan) [Timber Rattlesnake Conservation Plan § 3.2.2]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	100% biodegradable materials will be used for erosion control/moisture containment blankets within 19 areas identified in Figures 2-30 (Timber Rattlesnake Conservation Plan) [Timber Rattlesnake Conservation Plan § 3.2.2]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Designated PFBC approved timber rattlesnake biologist will ensure the proper construction Bumps are used to reduce the risk of entrapment of reptiles and amphibians within 19 areas identified in Figures 2-30 (Timber Rattlesnake Conservation Plan) [Timber Rattlesnake Conservation Plan § 3.2.2]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction Monitoring	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	All monitoring and handling conducted by PFBC approved timber rattlesnake biologists possessing the proper Scientific Collector Permits and proper skills to handle this species [Timber Rattlesnake Conservation Plan § 3.2.3]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction Monitoring	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	PFBC approved timber rattlesnake biologists will be the primary point of contact whenever construction crews encounter a rattlesnake [Timber Rattlesnake Conservation Plan § 3.2.3]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction Monitoring	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	PFBC approved timber rattlesnake biologists will be responsible for pre-construction surveys, during construction monitoring, capture and handling, and all reporting of findings and activities [Timber Rattlesnake Conservation Plan § 3.2.3]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction Monitoring	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Construction monitoring by PFBC approved timber rattlesnake biologist will only be required between April 15 and October 15 during the timber rattlesnake's active season. Figures 37 to 46 (Timber Rattlesnake Conservation Plan) provide areas proposed for construction monitoring and were derived in consultation with Stan Boder (PFBC approved timber rattlesnake biologist) and were determined based on habitat and results of the 2014 and 2015 surveys [Timber Rattlesnake Conservation Plan § 3.2.3]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction Monitoring	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Monitoring will be restricted to 11 monitoring areas depicted on Figures 37 to 46 (Timber Rattlesnake Conservation Plan) with concentrated efforts on potential and confirmed denning and gestation habitats. Monitoring includes all construction areas including access roads and staging areas within the 11 monitoring areas [Timber Rattlesnake Conservation Plan § 3.2.3]

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Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction Monitoring	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Pre-construction surveys will be conducted within 48 hours prior to the scheduled construction activity. Purpose is to find rattlesnakes within the construction corridor and ensure that they are safely removed [Timber Rattlesnake Conservation Plan § 3.2.3]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction Monitoring	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	If construction activities in the timber rattlesnake monitoring areas temporarily cease/break in the construction sequencing, then re-inspection of the work areas will be warranted prior to next scheduled activity [Timber Rattlesnake Conservation Plan § 3.2.3]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction Monitoring	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	If trench or bore pit is left open within the monitoring areas, daily inspection of trench/pit for trapped rattlesnakes and other wildlife will be required until these areas are backfilled [Timber Rattlesnake Conservation Plan § 3.2.3]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Construction Monitoring	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Snakes observed in construction area will be captured and relocated to previously selected release site. Captured snakes will be moved to distance minimizing linear distance from point of capture while simultaneously reducing probability of immediate return. SPLP will install temporary silt fencing for approximately 200 feet along the edge of the workspace facing the release point to prevent relocated individuals from returning to construction area [Timber Rattlesnake Conservation Plan § 3.2.3]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Restoration	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Project LODs intersect six confirmed gestation habitats. Gestation habitats will be intensely monitored during construction and restoration. Gestation habitats have and will be again photographed prior to construction and restored to the existing condition to the maximum extent practicable. PFBC approved timber rattlesnake biologists will use the PFBC's Guidelines for *Timber Rattlesnake Habitat Creation (revised 3-5-2010) Food Plots - Gas Well Openings - Access Roads - Pipelines* to ensure gestation habitats are properly restored to pre-construction condition in terms of rock placement and aerial extent of the area [Timber Rattlesnake Conservation Plan § 3.3.1]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Restoration	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	All created and restored habitats will be thoroughly documented in the field and presented within the final report [Timber Rattlesnake Conservation Plan § 3.3.1]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Operations	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Routine operation and maintenance activities (e.g., mowing, erosion control, bank stabilization) will not require special mitigation efforts other than training of the maintenance crew. Any timber rattlesnake encountered during routine activities will be left undisturbed and area will be vacated. If areas are in need of excavation or repair, SPLP follows appropriate environmental protocols (e.g., PNDI searches to ensure activities will not impact sensitive species) [Timber Rattlesnake Conservation Plan § 3.3.2]
Timber Rattlesnake	PAFBC	NA	Indiana, Cambria, Blair, Huntington, Juniata, Perry, Cumberland	NA	Reporting	09/22/15	Timber Rattlesnake Conservation Plan (August 2015)	Report summarizing implementation of Timber Rattlesnake Conservation Plan will be submitted to PFBC upon completion of pipeline construction and ROW restoration. Report includes: name(s) and qualifications of investigator(s); survey/monitoring date(s); areas surveyed/monitored; number of timber rattlesnakes observed; sex/length of timber rattlesnakes captured; location of observations/captures; mitigation measures implemented; details regarding restored and created habitats; and, observations of other herpetofauna [Timber Rattlesnake Conservation Plan § 3.2.3]
Freshwater Mussels (Rainbow Mussel, Yellow Lampmussel, Elktoe, Triangle Floater)	PAFBC	Aughwick Creek, Tuscarora Creek, Conodoguinet Creek	Huntingdon/ Juniata/ Cumberland	NA	Construction	10/26/15	NA	Drill/bore Aughwick Creek, Tuscarora Creek, and Conodoguinet Creek and implement PAFBC contingency recommendations for drilling/boring operations. [PAFBC letter dated 10/26/2015]
Fish (Ghost Shiner, Brook Stickleback)	PAFBC	Monongahela River, Little Conemaugh River	Washington/ Allegheny/ Cambria	NA	Construction	10/26/15	NA	Drill/bore the Monongahela River and Little Conemaugh River and implement PAFBC contingency recommendations for drilling/boring operations [PAFBC letter dated 10/26/2015]

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Eastern Redbelly Turtle	PAFBC	Pond A4 and Wetland I2	A4 (Chester), W-I2 (Delaware)	NA	Construction	10/26/15	NA	1. Pond A4 is adjacent to the workspaces. Wetland I2 is adjacent and will be crossed underneath via HDD. Wetland I2 will have no direct impact. A silt fence barrier will be placed at the edge of the LOD, between water and work areas, to prevent turtles from accessing active work zones at these two locations. The fence will be installed during inactive period (October 15-April 15) 2. Any turtle found on the site will be relocated to nearest aquatic habitat and the PFBC will be contacted within 48 hours. [PAFBC letter dated 10/26/2015]
Eastern Redbelly Turtle	PAFBC	Stream H52 and Wetland Q75	Chester	NA	Construction	10/26/15	NA	No in-stream construction at Stream H52 near Wetland Q75 during the over-wintering period of the redbelly turtle (October 15 to April 15). Any instream construction activities should take place between April 15 and October 15 at Stream H52 near Wetland Q75 in to allow turtles to avoid the project area while they are active. Any turtles found within the staging area of the Project should be safely moved outside the work zone in appropriate habitat [PAFBC letter dated 10/26/2015]
Allegheny Woodrat	PGC	NA	Bowers Mountain 2 (Perry)	NA	Pre-Construction	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	At request of DCNR, SPLP will hire qualified woodrat biologist to live trap for 4 nights with 40 traps (160 trap nights) on the southern side of the existing pipeline at the Bowers Mountain 2 habitat area located within Tuscarora State Forest. Traps placed up to 50 feet from existing pipeline within suitable habitat and conducted in accordance with PGC's Allegheny Woodrat Survey protocol. Up to 10 captured woodrats fitted with radio telemetry transmitters allowing tracking of movements and survival. Each woodrat tracked nightly using radio telemetry for minimum of 3 weeks to begin the night immediately following the attachment of the transmitter. Tracking period will be planned to include minimum 10 days prior and 11 days after initial land disturbance. A report summarizing nightly movements of each woodrat provided to PGC and DCNR upon completion of study [Allegheny Woodrat Conservation Plan § 4.1]
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Construction	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Work areas will be cleared of vegetation and rocks within the four occupied habitats to the minimum extend practicable allowing safe installation of pipelines [Allegheny Woodrat Conservation Plan § 4.2].
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	After installation and during grading back, windrowed rocks restored to pre-existing conditions to the maximum extent within habitat areas while allowing for safe operation of pipeline. Clear travel lane for vehicle access will remain parallel and adjacent to installed pipelines to allow repair and inspection [Allegheny Woodrat Conservation Plan § 4.2]
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	SPLP will create new potential woodrat habitat in form of rock structures following the criteria stated in PGC's Allegheny Woodrat The Environmental Review Process for Pennsylvania document. Six rock structures are proposed within the four areas [Allegheny Woodrat Conservation Plan § 4.3] SPLP will construct travel corridors in the form of rock structures to allow woodrats to safely cross the existing and proposed ROW in Jacks Mountain 3 [Letter to PGC dated 5/26/2016; [Allegheny Woodrat Conservation Plan § 5.0]
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	1 rock structure built at Jacks Mountain 2, 2 at Jacks Mountain 3 on SGL-71, 1 at Blacklog Mountain, and 2 at Bowers Mountain 2 on the Tuscarora State Forest [Allegheny Woodrat Conservation Plan § 4.3]

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Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Rock structures will be at least 5 ft in height, contain boulders at least 3 ft in diameter arranged to maximize amount of openings present. Structures will be approximately 25 feet long and 10 feet wide for those proposed at Jacks Mountain 2, Blacklog Mountain, and Bowers Mountain 2. The two structures acting as travel corridors at Jacks Mountain 3 will be approximately 15 feet wide and have lengths of approximately 86 feet and 75 feet due to the angles of the existing ROW and new ROW [Allegheny Woodrat Conservation Plan § 4.3]
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	If possible, underground openings will be used to create deepest caverns possible. Flat rocks with as many flat ledges as possible will be created for latrines and food caches, smaller boulders placed around the edges of core habitat [Allegheny Woodrat Conservation Plan § 4.3]
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Rock excavated during construction should be saved and used for rock structure creation [SPLP - Pennsylvania Pipeline SGL 71 Woodrat Mitigation Plan found within the AWR Conservation Plan (May 2016)]
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Large angular rocks (>3 feet in diameter) placed in core of structure to promote ledges, overhangs, caves, and interior passages [SPLP - Pennsylvania Pipeline SGL 71 Woodrat Mitigation Plan found within the AWR Conservation Plan (May 2016)]
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Medium-small angular rocks (>1 foot in diameter) placed over the core rocks to depth of 2 feet [SPLP - Pennsylvania Pipeline SGL 71 Woodrat Mitigation Plan found within the AWR Conservation Plan (May 2016)]
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Avoid transferring soil from excavation site to rock structures- screen/wash smaller rocks to remove excess soil prior to final placement on structures [SPLP - Pennsylvania Pipeline SGL 71 Woodrat Mitigation Plan found within the AWR Conservation Plan (May 2016)]

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Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Except at Bowers Mountain 2 habitat area, all structures will be constructed within temporary workspace adjacent to the permanent easement/license agreement. At Bowers Mountain 2, the structures will traverse the existing 8-inch pipeline ROW and this proposed easement, however gaps will need to be placed at the intersection of the structure with existing pipelines and along a travel lane [Allegheny Woodrat Conservation Plan § 4.3]
Allegheny Woodrat	PGC	NA	Jacks Mountain 2 (HU), Jacks Mountain 3 (HU), Blacklog Mountain (HU), Bowers Mountain 2 (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Construction of rock structures will be overseen by trained biologist who has performed woodrat surveys and is familiar with habitat characteristics and needs [Allegheny Woodrat Conservation Plan § 4.3]
Allegheny Woodrat	PGC	NA	Jacks Mountain 3/ SGL 71 (HU)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	In addition to the 2 rock structures at Jacks Mountain 3, PGC has requested additional measures at this location as outlined in the PGC authored mitigation plan (May 9, 2016) titled "Sunoco - Pennsylvania Pipeline SGL 71 Woodrat Mitigation Plan". SPLP will plant 300 Pennsylvania seedlings comprised of seven Species (American chestnut, common [black] elderberry, blackberry, smooth gooseberry, American black currant, devil's walking stick, and American hazelnut). 100 must be American chestnut and at least 100 must be common (black) elderberry. PGC identified 62.4 acre area where plantings should occur and smaller 16.4 acre subset of the area must have 50 percent of the 300 total plantings [Allegheny Woodrat Conservation Plan § 4.3] SPLP ensure 70% survival rate for 3 months after planting [Allegheny Woodrat Conservation Plan § 4.2] The details and special conditions for these plantings must reference the AWR Conservation Plan and specifically the Sunoco - Pennsylvania Pipeline SGL 71 Woodrat Mitigation Plan included as an Appendix D to that plan.
Allegheny Woodrat	PGC	NA	Bowers Mountain 2/ Tuscarora SF (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	At Bowers Mountain 2 habitat area located on the Tuscarora SF, SPLP will enhance existing occupied habitat areas by cutting undesirable tree species (e.g., birch and maple) and planting mast producing species such as hawthorn, black oak, scrub oak, and American mountain ash. Cuttings and plantings will be limited to portions of the identified occupied habitat polygons that occur outside of the LOD and represents a total of 28.4 acres. [Allegheny Woodrat Conservation Plan § 4.3] The details and special conditions for these plantings must reference the AWR Conservation Plan and specifically the DCNR Bureau of Forestry - Wood Rat Habitat Plan Parameters included as an Appendix E to that plan.
Allegheny Woodrat	PGC	NA	Bowers Mountain 2/ Tuscarora SF (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Approximately 139 seedlings will be planted in accordance with PGC protocols listed above for SGL 71. In temporary workspaces intersecting the occupied woodrat habitat, SPLP will include plantings of mast producing species such as sassafras, grape, black gum, sumac, and pitch pine during restoration, totaling approximately 1 acre and no more than 80 seedlings planted in these areas [Allegheny Woodrat Conservation Plan § 4.3]
Allegheny Woodrat	PGC	NA	Bowers Mountain 2/ Tuscarora SF (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	SPLP will create 1/4 acre food plot on southern side of existing ROW adjacent to existing woodrat habitat by removing undesirable species and planting diverse community of mast producing species which will include grey dogwood, arrow-wood viburnum, nannyberry, maple-leaf viburnum, black-haw, hawthorn, beaked hazelnut, scrub oak, black oak, flowering dogwood, silky dogwood, chokeberry, American mountain ash, hybrid chestnuts. If plantings do not maintain 75% survival through second growing season following construction, additional planting will be performed. [Allegheny Woodrat Conservation Plan § 4.3]
Allegheny Woodrat	PGC	NA	Bowers Mountain 2/ Tuscarora SF (Perry)	NA	Restoration	06/08/16	Allegheny Woodrat Conservation Plan (May 2016)	Food plot will be gated (new steel gate) and fenced off to prevent deer grazing. Area to be fenced/number of gates determined by district forester. New steel gates will serve as access for the food plot and for future access of ROW [Allegheny Woodrat Conservation Plan § 4.3]

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Eastern Small-footed bat	PGC	NA	Cambria, Blair, Huntingdon, and Perry	NA	Pre-Construction	06/08/16	Eastern Small-footed Bat Conservation Plan (January 2016)	SPLP will prevent small-footed bats from accessing summer roosting habitat identified within the Project LOD to avoid any chance of incidental take during construction. Prior to emergence from hibernation (March 31), SPLP will seal off these areas with geotextile material such as silt fencing, mesh screening, or other appropriate materials (max size of 2 mesh/inch will be installed). Cover materials will completely seal off all entrances, cracks, and crevices to potential roosting sites thereby preventing entry of small-footed bats, ensuring no harm or incidental take of this species during construction activities in identified habitat areas [Eastern Small-footed Bat Conservation Plan § 4.1]
Eastern Small-footed bat	PGC	NA	Cambria, Blair, Huntingdon, and Perry	NA	Restoration	06/08/16	Eastern Small-footed Bat Conservation Plan (January 2016)	Following completion of construction, SPLP will construct roosting structures as close to the areas of impacted habitat as possible. Using a mitigation rate of 3:1, which yields 5 acres, and a rate of four structures per acre, SPLP will construct twenty new roosting structures [Eastern Small-footed Bat Conservation Plan § 4.2]
Eastern Small-footed bat	PGC	NA	Cambria, Blair, Huntingdon, and Perry	NA	Restoration	06/08/16	Eastern Small-footed Bat Conservation Plan (January 2016)	Goal for roosting structures is to be created in areas of temporary disturbance such as along the temporary ROW, temporary workspaces, or in areas adjacent to these spaces. Final location of the structures also dictated by land availability [Eastern Small-footed Bat Conservation Plan § 4.2]
Eastern Small-footed bat	PGC	NA	Cambria, Blair, Huntingdon, and Perry	NA	Restoration	06/08/16	Eastern Small-footed Bat Conservation Plan (January 2016)	In accordance with Pennsylvania Game Commission Eastern Small Footed Bat Environmental Review Roost Structure Guidance Document (August 2014 Revision), newly created roosting structures will have inner core that is 10-ft wide and 5-ft tall. Core will be covered by multiple layers of large flat rocks of varying sizes, maximizing cracks and crevices that contain 1-2 inch openings with some openings as narrow as 1/4-inch to provide protection from predators (e.g. snakes). Outer rocks and caps will be shingled to ensure precipitation does not enter structure. Rocks used will be cleaned of dirt and organic materials, limestone won't be used unless working in karst areas [Eastern Small-footed Bat Conservation Plan § 4.2]
Eastern Small-footed bat	PGC	NA	Cambria, Blair, Huntingdon, and Perry	NA	Restoration	06/08/16	Eastern Small-footed Bat Conservation Plan (January 2016)	Structures arranged so that they are oriented southeast to west to receive greatest amount of sunlight exposure during the day, placed in close proximity to forested or early successional habitat to provide bats with cover from predators and travel corridors. If possible, structures placed in close proximity to perennial sources of water (e.g., wetlands, streams, riparian areas). Multiple rock piles constructed in same area will be spaced and grouped appropriately following evaluation of the impacted landscape [Eastern Small-footed Bat Conservation Plan § 4.2]
Eastern Small-footed bat	PGC	NA	Cambria, Blair, Huntingdon, and Perry	NA	Monitoring	06/08/16	Eastern Small-footed Bat Conservation Plan (January 2016)	After completion of structures, emergence surveys performed by an experienced bat biologist during summer months to monitor usage. Performed over three year period or until bats seen emerging from structures. Three surveys performed at each structure to obtain 3 separate nights of data from different parts of survey season. First survey during second or third week of June, second during second week of July, final during last week of July [Eastern Small-footed Bat Conservation Plan § 4.2]
Northeastern Bulrush	USFWS	Vicinty of W59	Cambria	NA	Construction	10/31/16	North-eastern Bulrush Conservation Plan (September 2015)	Impacts to population, vernal pool/wetland location of the population, and other wetlands located in the vicinity by HDD under 1684-ft section of proposed centerline. HDD begins on southeast side of access road approximately 150-ft southeast of the northeastern bulrush population, continues approximately 1684-ft, and ends approximately 1534-ft northwest of the bulrush population location. HDD will be approximately 50 ft below soil surface while passing under population. No travel through or tree clearing between entry and exit points on HDD [Northeastern Bulrush Conservation Plan § 3.2.2]
Northeastern Bulrush	USFWS	Vicinty of W59	Cambria	NA	Monitoring	10/31/16	North-eastern Bulrush Conservation Plan (September 2015)	Environmental Inspector will ensure construction fencing will be installed and no accesses signs placed on NW side of access road to avoid potential inadvertent use of area for travel through or other unplanned activities. Access will be limited between the HDDs to foot-travel inspection of inadvertent returns and any professional land survey required. Area will be regularly inspected for compliance [Northeastern Bulrush Conservation Plan § 3.2.2]
Northeastern Bulrush	USFWS	Vicinty of W59	Cambria	NA	Construction	10/31/16	North-eastern Bulrush Conservation Plan (September 2015)	Inadvertent Return Plan provides summary of preventative measures to minimize risk of inadvertent return and responsive measures to be implemented in unlikely event of inadvertent return [Northeastern Bulrush Conservation Plan § 3.2.2]
Northeastern Bulrush	USFWS	Vicinty of W59	Cambria	NA	Monitoring	10/31/16	North-eastern Bulrush Conservation Plan (September 2015)	After completion of construction, one post-construction site visit conducted by qualified northeastern bulrush surveyor to monitor identified northeastern bulrush populations. Visit will document completed Project activities in vicinity of identified populations during recommended survey periods (July - September) to count northeastern bulrush populations (total culms and reproductive culms) and describe wetland habitats they are located in. [Northeastern Bulrush Conservation Plan § 3.2.3]
Northeastern Bulrush	USFWS	Vicinty of W59	Cambria	NA	Reporting	10/31/16	North-eastern Bulrush Conservation Plan (September 2015)	Brief letter report summarizing results of post-construction monitoring will be submitted to USFWS [Northeastern Bulrush Conservation Plan § 3.2.3]

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Bog turtle	USFWS	NA	NA	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Environmental training will be required for all personnel working in the ROW. Training will include a section on wildlife protection focusing on sensitive species such as the bog turtle [Bog Turtle Conservation Plan § 2.2.1]
Bog turtle	USFWS	C6	Berks	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	SPLP will dry-bore Wetland C6 [Letter to USFWS dated 10/31/2016]
Bog turtle	USFWS	AM2	Berks	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	AM2 will be crossed with an open trench with special protection exclusion measures and monitoring by a Qualified Bog Turtle Surveyor [Letter to USFWS dated 10/31/2016]
Bog turtle	USFWS	C44, AM1, AM2, C7, and C8	Berks	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Five adjacent wetlands (C44, AM1, AM2, C7, and C8) will be protected through implementation of BMPs outlined in Bog Turtle Conservation Plan [Letter to USFWS dated 10/31/2016]; Work areas found within 300 feet of C7, C8, AM1, AM2, and C44 will have bog turtle exclusion fencing placed between wetland and construction area and Qualified Bog Turtle Surveyor present for monitoring during construction when it occurs during the active bog turtle season [Bog Turtle Conservation Plan § 2.2.1]
Bog turtle	USFWS	A54/A55	Lancaster	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	SPLP will HDD Wetland A54 and A55 [Letter to USFWS dated 10/31/2016]
Bog turtle	USFWS	A54/A55	Lancaster	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Workspace and access between A54 and A55 will be off-limits to construction activity/disturbance and would only be utilized in case of an emergency [Bog Turtle Conservation Plan § 2.2.1]
Bog turtle	USFWS	A54/A55	Lancaster	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Service requested series of piezometers installed within Wetlands A54 and A55 to monitor groundwater conditions before, during, and after HDD takes place. SPLP committed to placing piezometers within wetlands as requested. Detailed plan will be submitted to Service for review prior to installation including proposed well locations, installed methodology, frequency of water level readings, and reporting methodology. Number of wells and frequency of water level readings sufficient to characterize groundwater levels within wetlands. SPLP will work with Qualified Bog Turtle Surveyor to ensure installation and monitoring does not affect species or alter habitat within wetlands. Preconstruction groundwater monitoring will begin with installation of piezometers within 2 weeks of receipt of USFWS approval of the plan and continue through construction for 1 year following successful installation of pipelines under these wetlands [Bog Turtle Conservation Plan § 2.2.1]
Bog turtle	USFWS	A54, A55, C6, C7, C8, AM2, C44, C42	Lancaster and Berks	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	A Qualified Bog Turtle Surveyor will be on site during all construction activities occurring across or in vicinity of bog turtle wetlands listed in Table 2 of Bog Turtle Conservation Plan [Bog Turtle Conservation Plan § 2.2.2]
Bog turtle	USFWS	A54, A55, C6, C7, C8, AM2, C44, C43	Lancaster and Berks	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Bog turtle wetlands include A54 (HDD), A55 (HDD), C6 (dry-bore), C7 (adjacent wetland), C8 (adjacent wetland), AM2 (open cut), C44 (adjacent wetland), and C43 (HDD). Qualified Bog Turtle Surveyor's responsibility is to monitor pre-construction, construction, and restoration activities to ensure plan is implemented to its fullest extent and work areas are not being exceeded and Project plans are being carried out. Also will ensure construction personnel are trained and proper BMPs are implemented, maintained, and removed as necessary upon completion of work in those areas. Multiple Qualified Bog Turtle Surveyors may be utilized to ensure all activities can be completed efficiently [Bog Turtle Conservation Plan § 2.2.2]
Bog turtle	USFWS	A54, A55, C6, C7, C8, AM2, C44, C44	Lancaster and Berks	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Qualified Bog Turtle Surveyor inspect the surveyed (e.g., staked) LOD and marked access roadways prior to disturbance, ensuring these areas match Project plans. Qualified bog turtle surveyors may need to clear vegetation by hand to height of 4 inches in some areas prior to start of construction for effective monitoring [Bog Turtle Conservation Plan § 2.2.2]
Bog turtle	USFWS	A54, A55, C6, C7, C8, AM2, C44, C45	Lancaster and Berks	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Surveys for bog turtles will occur prior to commencing any work related activities including installation of silt fencing. Daily surveys will be conducted in each active work space prior to construction each day [Bog Turtle Conservation Plan § 2.2.2]
Bog turtle	USFWS	A54, A55, C6, C7, C8, AM2, C44, C46	Lancaster and Berks	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Boundaries of habitat in close proximity to work areas temporarily marked to ensure no activities unintentionally conducted within bog turtle wetlands. Vertical curbing made of silt fence (min 10 in height) will be installed along entire wetland/upland boundary in work areas adjacent to bog turtle wetlands to prevent stormwater flowing from areas into the main wetland and prevent bog turtles from accessing proposed work spaces. Interior and exterior of barriers will be kept free of vegetation and monitored daily. Fencing will also "wall-off" any upland areas in the vicinity of bog turtle wetlands to further prevent turtles from entering project work spaces. Fencing locations, installation, maintenance, and cleanup will be closely monitored by Qualified Bog Turtle Surveyor [Bog Turtle Conservation Plan § 2.2.2]

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Bog turtle	USFWS	A54, A55, C6, C7, C8, AM2, C44, C47	Lancaster and Berks	NA	Post-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Post-construction measures include restoring and stabilizing uplands in proximity to bog turtle wetlands. Disturbed soils in adjacent uplands will be stabilized and restored per Erosion and Sedimentation Control and Pollution and Prevention Plans. Post-construction monitoring of these areas will be conducted to ensure that proper revegetation of native plant species occurs [Bog Turtle Conservation Plan § 2.2.2]
Bog turtle	USFWS	A54, A55, C6, C7, C8, AM2, C44, C48	Lancaster and Berks	NA	Post-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	After completion of construction, one post-construction survey will be conducted by Service-recognized bog turtle surveyor to monitor the identified populations [Bog Turtle Conservation Plan § 2.2.2]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Post-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	"No mowing" signs will be placed along the boundary of the in-ROW bog turtle wetlands A54 and A55 and prevent mowing within the wetland during post-construction routine pipeline ROW operation and maintenance activities. Additional signs placed at the edge of Zone 2 (300 feet from the edge of the wetland) to demarcate the limit of herbicide application within the ROW. Hand clearing within the Zone 2 areas will only occur between October 1 and March 31 to avoid impacts to individual bog turtles [Bog Turtle Conservation Plan § 2.2.2]
Bog turtle	USFWS	A55 and A54	Lancaster	NA	Pre-construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	All construction personnel, including professional survey personnel, will be trained on implementation of the HDD contingency plan, the identification of the species and its biology, and the location of areas of particular concern. All construction personnel, Environmental Inspectors, and on-site bog turtle specialists will be provided with the necessary Project plans, mapping permits, authorized impacts, clearance letters, conservation plans, and the HDD contingency plan prior to start of construction activities [Bog Turtle Conservation Plan Appendix F]
Bog turtle	USFWS	A55 and A54	Lancaster	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	At the bog turtle HDD, inspection of work areas and compliance with project plans carried out daily by bog turtle specialists. In addition, when drilling commences the BT Specialist will inspect all disturbed upland areas and silt fencing multiple times for bog turtles and inadvertent returns, including surfacing of ground water by bog turtle specialist. Multiple daily inspections for inadvertent returns within wetland areas determined unnecessary and a one-time daily inspection would reduce direct disturbance of normal behaviors if turtles present. Inspections will continue until drill is completed and inadvertent return risk in wetlands removed. Only if drilling contractor suspects an inadvertent return as determined from drilling progress and monitoring of drilling fluids would more than one daily inspection of wetlands for returns be performed [Bog Turtle Conservation Plan Appendix F]
Bog turtle	USFWS	All	All	NA	Construction, Restoration	10/31/16	Bog Turtle Conservation Plan (April 2016)	Construction personnel trained to report all turtle observations to EI immediately upon siting. All bog turtles not in harm's way will be documented within Project logs and reported to USFWS/USACE/PADEP within the final report. Documentation to include dates, times, photographs, and behavior [Bog Turtle Conservation Plan Appendix F]
Bog turtle	USFWS	All	All	NA	Construction, Restoration	10/31/16	Bog Turtle Conservation Plan (April 2016)	Bog turtles in harm's way shall be handled by bog turtle specialist assigned to area and only if handling determined necessary to remove risk of injury/death. Other project personnel allowed to move turtles small distances, but only in cases of immediate danger. Otherwise, use steps to passively remove threat and allow turtles to continue normal behavior. Turtles only moved to area within same wetland, only to distance necessary to remove threat. Additional silt fence installation may be required in area to prevent turtles from returning to areas presenting threat. Removal/relocation of construction activity in particular area will be considered if practicable to completing the drill. Bog turtles found within harm's way reported to USFWS immediately as an incident and how it was handled [Bog Turtle Conservation Plan Appendix F]
Bog turtle	USFWS	A55 and A54	Lancaster and Berks	NA	Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	SPLP will implement the Project's inadvertent return plan, that contains special bog turtle area procedures for the drill at A55/ A54 [Bog Turtle Conservation Plan]
Bog turtle	USFWS	AM2, AM3, C7, C8, and C44	Berks	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	1. Prior to performing construction in wetlands, streams, or uplands within 300 feet of potential bog turtle habitat, all areas of expected disturbance must be surveyed by qualified surveyor for presence of bog turtles immediately prior to construction commencement 2. Prior to survey, herbaceous vegetation should be cut to height of 4-6 inches using hand-held trimmer/weed-cutter, then carefully raked away from area to be searched, with qualified bog turtle surveyor present for clearing 3. Immediately following survey, silt fencing should be place between wetland and proposed construction zone while surveyor present ot ensure fencing is properly installed in correct location (to be removed immediately following construction 3. If bog turtles located in searches, Service and PFBC should be contacted immediately, construction should not proceed until further consultation occurs, and survey results should be submitted to Service and PFBC [Letter from USFWS dated 10/31/2016]

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Bog turtle	USFWS	A54 and A55	Lancaster	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Immediately following survey, silt-fencing should be placed between wetland and proposed construction zone while bog turtle surveyor is present to ensure fencing is properly installed in correct location. Silt-fencing should be removed immediately following construction [Letters from USFWS dated 10/31/2016; 9/15/2016]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Implement bog turtle radio-telemetry study protocol [Letter from USFWS dated 10/31/2016]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	Implement Service-approved vibration monitoring plan along the alignment and within wetlands if HDD activities extend into bog turtle dormant season [Letter from USFWS dated 10/31/2016]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	SPLP will conduct up to 8 days of bog turtle Phase 2 surveys (between September 18 and October 15, 2016) in order to capture approximately 10 appropriately sized bog turtles each in wetlands A54 and A55 to be fitted with transmitters. A total of 20 bog turtles fitted with transmitters is the goal of or this telemetry study [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	SPLP will deploy at least 20 bog turtle traps in A54 and A55. Traps will be used for at least 10 consecutive days, or at least until 10 bog turtles have been fitted with transmitters. Traps will be checked daily while deployed in A54 and A55 [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Pre-Construction	10/31/16	Bog Turtle Conservation Plan (April 2016)	All healthy adult bog turtles (target goal of 10 per wetland) of suitable size captured during surveys will be fitted with transmitters equipped with batteries having approximately 9 months of service life. Equal numbers of mailed and females will be fitted with transmitters to extent practical. Should Phase 2 and Phase 3 surveys during fall 2016 determine populations in A54 and A55 are lower than anticipated, number of bog turtles fitted with transmitters may be less than 10 in each wetland [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Construction, Restoration, Monitoring	10/31/16	Bog Turtle Conservation Plan (April 2016)	Bog turtles fitted with transmitters will be tracked twice a week during pre-construction time period to monitor bog turtle activity, identify fall travel patterns, and determine locations of over-wintering sites. All bog turtle locations will be recorded via sub-meter accuracy GPS technology and mapped accordingly. Bog turtles may be periodically checked/handled during this time period if no movement observed since previous field tracking and to ensure proper attachment of transmitter. Pre-construction time period will be approximately 4 weeks [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Construction, Restoration, Monitoring	10/31/16	Bog Turtle Conservation Plan (April 2016)	During active construction (when HDD is ongoing), bog turtles fitted with transmitters will be tracked at least every other day while drilling is active to monitor bog turtle activity and determine/confirm usage of over-wintering sites. All locations recorded via GPS technology (sub-meter accuracy) and mapped accordingly. No bog turtles will be handled or disturbed by biologist tracking the turtles during this time period [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Construction, Restoration, Monitoring	10/31/16	Bog Turtle Conservation Plan (April 2016)	During early post-construction, bog turtles fitted with transmitters will be tracked twice a week to monitor activity and determine/confirm usage of over-wintering sites. All locations recorded via GPS technology (sub-meter accuracy) and mapped accordingly. No bog turtles will be handled or disturbed by biologist tracking the turtles during this time period. Early post-construction time period will last 4 weeks [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Construction, Restoration, Monitoring	10/31/16	Bog Turtle Conservation Plan (April 2016)	All bog turtles fitted with transmitters will continue to be tracked and mapped at least 1 time per month until April 2017, at which time they will be captured and have transmitters removed [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]

Pennsylvania Pipeline Project
Pennsylvania Natural Diversity Inventory Condition Listing (11/13/16)

Species or Area	Agency	Water	County/AOC/ Survey Area	Population	Pre-Construction, Construction and Restoration, Post-Construction Activity	Clearance Letter	Conservation Plan	Primary Condition
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Construction, Restoration, Monitoring	10/31/16	Bog Turtle Conservation Plan (April 2016)	Bog turtles fitted with transmitters will be minimally handled during the study, and in any event, will be returned to their location of capture as soon as possible [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Construction, Restoration, Monitoring	10/31/16	Bog Turtle Conservation Plan (April 2016)	The USFWS/PFBC will be provided a map showing the location of the hibernating turtles, once all are hibernating [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Construction, Restoration, Monitoring	10/31/16	Bog Turtle Conservation Plan (April 2016)	Any large movements of over 15 feet from original hibernation location after November 1 and before April 1 or any surface operations during this time period will be immediately reported to USFWS/PFBC if movement or surfacing cannot be dismissed due to unseasonably warm weather [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Construction, Restoration, Monitoring	10/31/16	Bog Turtle Conservation Plan (April 2016)	Any mortalities will result in drill stoppage and immediate reporting to USFWS [SPLP Pipeline, L.P. Pennsylvania Pipeline Project (PPP) Radio-Telemetry Study Protocol for Bog Turtle Monitoring Associated with Horizontal Directional Drill (HDD) at Wetlands A54 and A55 in Lancaster County, Pennsylvania]
Bog turtle	USFWS	A54 and A55	Lancaster	NA	Operations	10/31/16	Bog Turtle Conservation Plan (April 2016)	SPLP will commit to protection of A54 and A55 through operation of the pipelines through the installation of no mowing signs, hand clearing, limited herbicide applications [Letter to USFWS dated 10/31/2016]
Indiana bat	USFWS	Those Located in Swarming Radius	Allegheny, Westmoreland, Cambria, Huntingdon, and Blair	NA	Pre-Construction	10/31/16	Myotis Conservation Plan (April 2016)	Limited tee clearing proposed where the Project traverses a portion of the Layton Clay Fire Mine and Hartman Mine Indiana bat swarming habitats. SPLP has agreed to implement tree clearing in these swarming areas between November 15 and March 31 [Myotis Conservation Plan §§ 2.2.1; 2.2.2]
Indiana bat, Northern long-eared bat	USFWS	Those Located in Swarming Radius	NA	NA	Pre-Construction	10/31/16	Myotis Conservation Plan (April 2016)	Environmental training is a requirement of all personnel working in the field on the ROW. Training will include section on wildlife protection in general, but also will focus on sensitive species, including discussion on Indiana bat and northern long-eared bat. Training will involve the identification of the LOD in general and any timing restrictions placed on various land disturbances, such as tree clearing [Myotis Conservation Plan § 2.2.1]
Migratory Birds	USFWS	Project Wide	NA	NA	Pre-Construction	10/31/16	Migratory Bird Conservation Plan (July 2016)	SPLP has reduced and minimizes impact project wide. See Migratory Bird Conservation Plan.
Andropogon glomeratus	PADCNR	NA	Cambira/AOC W10	Population 9	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	Minimization through use of soil segregation and replacement [Conservation Plan for Identified SOSC §3.2.1]
Andropogon glomeratus	PADCNR	NA	Cambria/AOC W10 and AOC ALT W1	Population 3	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	Soil Segregation and replacement [Conservation Plan for Identified SOSC §3.2.2]
Andropogon glomeratus	PADCNR	NA	Cambria/AOC W10 and AOC ALT W1	Population 1	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	HDD, timber mats in proposed travel lane [Conservation Plan for Identified SOSC §3.2.2]
Andropogon glomeratus	PADCNR	NA	Cambria/AOC W10 and AOC ALT W1	Population 2	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	HDD, neck down of proposed travel lane LOD [Conservation Plan for Identified SOSC §3.2.2]
Andropogon glomeratus	PADCNR	NA	Cambria/AOC W10 and AOC ALT W1	Population 4	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	No impacts- population outside of the proposed LOD for the Project [Conservation Plan for Identified SOSC §3.2.2]

Pennsylvania Pipeline Project
Pennsylvania Natural Diversity Inventory Condition Listing (11/13/16)

Species or Area	Agency	Water	County/AOC/ Survey Area	Population	Pre-Construction, Construction and Restoration, Post-Construction Activity	Clearance Letter	Conservation Plan	Primary Condition
Actaea podocarpa	PADCNR	NA	Cambria/ between AOC W10 and AOC ALT W2	Population 1	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	No impacts- stream crossing "tied-in" and completed within a single crossing and within 24-48 hours, trench opened and backfilled within this timeframe, SPLP will "sod" excavate" plant and its roots and restore the area with the same sod upon restoration all within 24-48 hours, population will be avoided by installation of construction fencing [Conservation Plan for Identified SOSC §3.2.2] Monitoring report will be submitted to DCNR for review detailing success of the sod-excavation [PADCNR Letter 1/15/2016]
Actaea podocarpa	PADCNR	NA	Cambria/ between AOC W10 and AOC ALT W1	Population 1	Pre-Construction, Construction, Restoration	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	Tie-in will be monitored by a certified PA DEP botanist. Success of the restoration monitored the two days following restoration activities and again at 4 and 8 weeks following restoration [Conservation Plan for Identified SOSC §3.2.2] Or if sod-excavation conducted outside of the growing season, a similar monitoring schedule at earliest appropriate time [PADCNR Letter 1/15/2016]
Viola appalachiensis	PADCNR	NA	Cambria/ between AOC W10 and AOC ALT W0	Population 2	Pre-Construction, Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	Minimize impacts- installation of orange construction fence along the edge of the permanent ROW and implementation of an LOD reduction [Conservation Plan for Identified SOSC §3.2.2]
Viola appalachiensis	PADCNR	NA	Cambria/ between AOC W10 and AOC ALT W1	Population 3	Pre-Construction, Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	Minimize impacts- inclusion of additional reductions of the temporary LOD near northern end of population 3 [Conservation Plan for Identified SOSC §3.2.2]
Scirpus ancistrochaetus	PADCNR	NA	Cambria/AOC ALT W1	Population 1	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	No impacts- HDD bore will travel beneath this population [Conservation Plan for Identified SOSC §3.2.3]
Andropogon glomeratus	PADCNR	NA	Cambria/AOC ALT W1	Population 5	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	No impacts- HDD bore will travel beneath this population [Conservation Plan for Identified SOSC §3.2.3]
Antennaria virginica	PADCNR	NA	Blair/AOC W14	Populations 3,8,16	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	Unavoidable impacts anticipated- minimization through the use of soil segregation and replacement [Conservation Plan for Identified SOSC §3.2.4]
Antennaria virginica	PADCNR	NA	Blair/AOC W14	Populations 7 and 9	Monitoring	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	SPLP has agreed to conduct monitoring of these populations for three (3) years annually to document recolonization and success of the minimization and mitigation strategies [PADCNR Letter 1/15/2016]
Carex shortiana	PADCNR	NA	Juniata/ AOC E1	Populations 4,5	Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	No impacts- HDD bore will travel beneath this population [Conservation Plan for Identified SOSC §3.2.5]
Polygala polygama	PADCNR	NA	Perry/ AOC E2	Populations 1,2,3,5	Pre-Construction	11/15/15	Conservation Plan for Identified Species [Plants] of Special Concern (November 2015)	Minimization through pipeline alignment and LOD shift. Routing through the State Forest has already been agreed upon by the PADCNR and Tuscarora State Forest District Forester and was routed to the south to avoid majority of impacts to these SOSC [Conservation Plan for Identified SOSC § 3.2.6

APPENDIX B

EROSION AND SEDIMENT CONTROL DETAILS

PENNSYLVANIA PIPELINE PROJECT

EROSION & SEDIMENT CONTROL AND SITE RESTORATION PLAN NOTES AND DETAILS

DRAWING INDEX	
SHEET No.	DRAWING TITLE
ES-0.01 TO ES-0.23	EROSION & SEDIMENT CONTROL & SITE RESTORATION PLAN NOTES AND DETAILS
ES-0.24 TO ES-0.25	KEY PLAN
ES-1.01 TO ES-1.62	EROSION & SEDIMENT CONTROL & SITE RESTORATION PLANS

PREPARED BY:

TETRA TECH

complex world | CLEAR SOLUTIONS™

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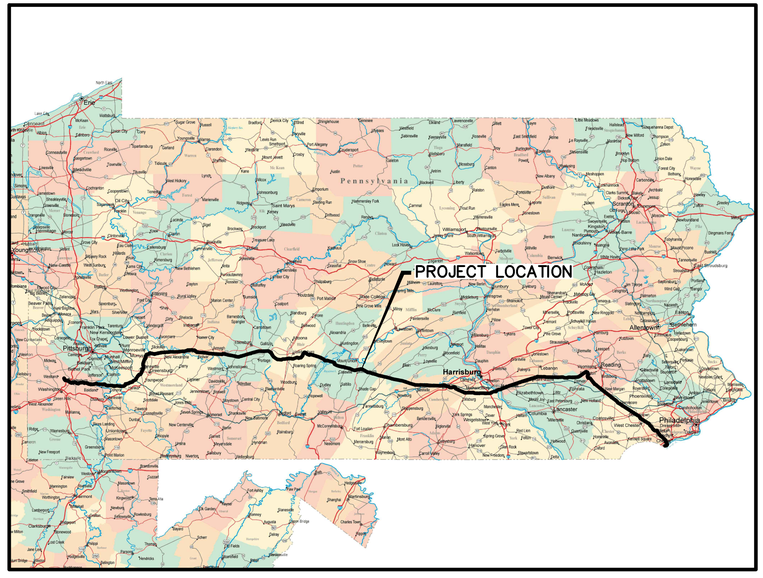
PREPARED FOR:

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA



LOCATION MAP
PENNSYLVANIA PIPELINE PROJECT
HOUSTON, PENNSYLVANIA TO MARCUS HOOK, PENNSYLVANIA

GENERAL EROSION & SEDIMENT CONTROL PLAN NOTES:

1. TOPOGRAPHIC MAPPING AND FEATURES COMPILED FROM WWW.PASDA.PSU.EDU.
2. THE PROJECT TAKES PLACE WITHIN PENNSYLVANIA.
3. TOWNSHIP BOUNDARIES TAKEN FROM WWW.PASDA.PSU.EDU.
4. 100-YEAR FEMA FLOODPLAINS TAKEN FROM WWW.PASDA.PSU.EDU.
5. SEE SHEET ES-0.02 FOR STREAM AND WETLAND CROSSING TABLE.
6. A PRECONSTRUCTION MEETING IS REQUIRED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY. THE OWNER AND/OR OPERATOR SHALL INVITE ALL CONTRACTORS, THE LANDOWNER, APPROPRIATE MUNICIPAL OFFICIALS, THE E&S PLAN PREPARER, AND A REPRESENTATIVE FROM THE LOCAL PADEP OR CONSERVATION DISTRICT TO AN ON-SITE PRECONSTRUCTION MEETING AT LEAST SEVEN DAYS IN ADVANCE.
7. A COPY OF THE APPROVED E&S PLANS MUST BE AVAILABLE AT THE PROJECT SITES AT ALL TIMES.
8. AT LEAST THREE DAYS PRIOR TO STARTING EARTH DISTURBANCE ACTIVITY, ALL CONTRACTORS INVOLVED IN THESE ACTIVITIES SHALL NOTIFY PENNSYLVANIA ONE CALL SYSTEM, INC. AT 8-1-1. CONTRACTOR MUST RECEIVE ALL CLEARANCES BEFORE STARTING CONSTRUCTION ACTIVITIES.
9. PIPELINE LOCATIONS AND LIMIT OF DISTURBANCE (LOD) FROM SUNOCO PIPELINE L.P.
10. GENERAL LOCATION AND SPACING FOR WATER BARS ARE SHOWN ON THE PLAN. WATER BARS LOCATION MAY BE ADJUSTED IN THE FIELD DUE TO ACTUAL SITE CONDITIONS; HOWEVER, INSTALLATION AND SPACING MUST CONFORM TO THE DETAIL PROVIDED ON THE PLAN SHEET ES-0.08.
11. THE RIGHTS-OF-WAYS AND EASEMENTS SHOWN ON THIS PLAN ARE THE RESPONSIBILITY OF SUNOCO PIPELINE L.P. TO SECURE WITH THE INDIVIDUAL PROPERTY OWNER. THE RIGHTS-OF-WAY AND EASEMENTS SHOWN ON THIS PERMIT DRAWING REPRESENT THE BEST AVAILABLE PROPERTY INFORMATION AS PROVIDED TO TETRA TECH, INC. BY SUNOCO PIPELINE L.P. THE RIGHTS-OF-WAY AND EASEMENTS SHALL BE VERIFIED AND LOCATED IN THE FIELD BY SUNOCO PIPELINE L.P.
12. GENERAL E&S CONTROLS FOR SOIL STOCKPILE LOCATIONS ARE SHOWN ON THE TYPICAL DETAILS. ALONG THE ALIGNMENT, TOPSOIL WILL BE PUSHED TO ONE SIDE OF THE RIGHT OF WAY. THE TOPSOIL WILL BE PUSHED BACK DURING SITE RESTORATION. TOPSOIL WILL BE SEGREGATED AT ALL LOCATIONS THROUGHOUT THE PROJECT WHERE TOPSOIL EXISTS.
13. COMPOST FILTER SOCK INSTALLATION TO BE ADJUSTED AS NEEDED TO ACCOMMODATE ACTUAL CONTOURS IDENTIFIED IN FIELD DURING VARIOUS PHASES OF THE PROJECT.
14. IN-STREAM CONSTRUCTION IS RESTRICTED IN STOCKED TROUT STREAMS FROM MARCH 1 THROUGH JUNE 15 WHERE NOTED.
15. IN-STREAM CONSTRUCTION IS RESTRICTED IN WILD TROUT STREAMS FROM OCTOBER 1 THROUGH DECEMBER 31 WHERE NOTED.
16. THIS PROJECT WILL REQUIRE WATER FOR DUST CONTROL, PIPELINE CLEANING, HORIZONTAL DIRECTIONAL DRILLING AND HYDROSTATIC TESTING OF THE PIPELINE AND MAINLINE VALVES. ALL WATER FOR THESE ACTIVITIES WITHIN THE DELAWARE RIVER BASIN WILL BE SOURCED FROM MUNICIPAL WATER SOURCES. NO SURFACE WATER WITHDRAWAL WITHIN THE DELAWARE RIVER BASIN IS PROPOSED FOR THIS PROJECT.
17. ALL WATER USED FOR HYDROSTATIC TESTING OF THE PIPELINE AND MAINLINE VALVES WITHIN THE DELAWARE RIVER BASIN WILL BE DISCHARGED THROUGH THE DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY VIA SUNOCO FACILITIES AT MARCUS HOOK, DELAWARE COUNTY, PA.
18. PORTIONS OF THE PROJECT LOD HAVE BEEN DESIGNATED "TRAVEL LANES" WITH THE FOLLOWING CLASSIFICATIONS:
    - A. TRAVEL AND CLEARING LOD – MECHANICAL CLEARING OF LAND BETWEEN HORIZONTAL DIRECTIONAL DRILL HDD WORKSPACES FOR LINE OF SIGHT AND, IN SOME CASES, ACCESS PURPOSES.
    - B. TRAVEL LOD – AREA NEEDED TO TRAVEL BETWEEN HORIZONTAL DIRECTIONAL DRILL WORKSPACES OR DOWN THE RIGHT-OF-WAY TO GET TO A HORIZONTAL DIRECTIONAL DRILL WORKSPACE.
19. VOID MITIGATION PLAN FOR KARST TERRAIN AND UNDERGROUND MINING IS TO BE REVIEWED PRIOR TO CONSTRUCTION AND IMPLEMENTED AS NECESSARY OR REQUIRED THROUGHOUT CONSTRUCTION.
20. AT BLOCK VALVE SITES, FIELD SURVEYS WERE CONDUCTED TO ACCURATELY REFLECT FIELD CONDITIONS TO FACILITATE THE DESIGN OF THE SITES. THESE SURVEYS WERE CONDUCTED IN THE IMMEDIATE VICINITY OF THE PAD AND ROAD TO BE DESIGNED. DUE TO THE NATURE OF POST CONSTRUCTION STORMWATER DESIGN CRITERIA, SURVEY COULD NOT BE CONDUCTED FOR THE ENTIRE DRAINAGE AREAS AT EACH LOCATION. IN THESE AREAS, LIDAR DATA WAS SUBSTITUTED.

DETAIL INDICATOR

DETAIL NUMBER

SHEET SHOWN ON

LEGEND

- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING TREE LINE
- EXISTING FENCELINE
- EXISTING STREAM WITH FLOW DIRECTION
- EXISTING ELECTRIC OVERHEAD
- EXISTING ELECTRIC UNDERGROUND
- EXISTING LIGHT POLE
- EXISTING WATER LINE
- EXISTING GAS LINE
- EXISTING DOMINION GAS LINE
- EXISTING SANITARY SEWER LINE
- EXISTING BUILDING
- PROPERTY LINE
- COUNTY BOUNDARY
- TOWNSHIP BOUNDARY
- 100-YEAR FLOODWAY
- 100-YEAR FEMA FLOODWAY
- 100-YEAR FEMA FLOODPLAIN
- WATERSHED BOUNDARY
- ORANGE CONSTRUCTION FENCE
- EXISTING PEM WETLAND
- EXISTING PFO WETLAND
- EXISTING PSS WETLAND
- PROPOSED PIPE LOCATION
- PROPOSED PERMANENT RIGHT-OF-WAY
- PROPOSED TEMPORARY RIGHT-OF-WAY
- PROPOSED TEMPORARY WORKSPACE
- RIPARIAN FOREST BUFFER
- OUTFALL FLOW DIRECTION ARROW
- LIMIT OF DISTURBANCE (ESCGP-2 PERMIT BOUNDARY)/ AREA TO BE RESTORED
- ROCK CONSTRUCTION ENTRANCE — 1 / 0.05
- ROCK CONSTRUCTION ENTRANCE WITH WASH RACKS — 3 / 0.05
- AGGREGATE STOCKPILE
- PERMANENT WATER BAR — 2 / 0.05
- TEMPORARY WATER BAR — 2 / 0.05
- EROSION CONTROL BLANKET — 4 / 0.05
- 12" COMPOST FILTER SOCK
- 18" COMPOST FILTER SOCK — 5 / 0.05
- 24" COMPOST FILTER SOCK
- COMPOST SOCK SEDIMENT TRAP — 6 / 0.06
- TRENCH PLUGS — 10 / 0.07
- TEMPORARY TIMBER MAT — 16 / 0.10
- TEMPORARY EQUIPMENT CROSSING — 15 / 0.10
- WATER DEFLECTOR — 13 / 0.07
- SPOIL STOCKPILE
- AREA TO BE BORED — HORIZONTAL DIRECTIONAL DRILL
- AREA TO BE BORED — G — CONVENTIONAL BORE
- ROW – TRAVEL AND CLEARING LOD
- ROW – TRAVEL LOD
- TEMPORARY UPSLOPE DIVERSION BERM
- TEMPORARY SLOPE PIPE
- A — TROUT STREAM RESTRICTION – NO IN-STREAM WORK BETWEEN OCT-DEC
- B — TROUT STREAM RESTRICTION – NO IN-STREAM WORK BETWEEN OCT-APR
- C — TROUT STREAM RESTRICTION – NO IN-STREAM WORK BETWEEN MAR-JUN & OCT-DEC
- D — TROUT STREAM RESTRICTION – NO IN-STREAM WORK BETWEEN MAR-JUN
- PFO — SPECIAL RESTORATION AREA – PFO TO PFO; SEE PFO RESTORATION PLANTING NOTES
- PSS — SPECIAL RESTORATION AREA – PSS TO PSS; SEE PSS RESTORATION NOTES
- SITE SPECIFIC PLAN DRAWING AREA. SITE SPECIFIC TOPOGRAPHIC SURVEY CONDUCTED IN THIS APPROXIMATE AREA. E&S CONTROL LAYOUT ON E&S PLAN MAY DIFFER FROM THE SITE SPECIFIC PLAN DUE ADDITIONAL SURVEY CONDUCTED IN THESE AREAS. SITE SPECIFIC PLAN SUPERSEDES E&S PLAN IN THESE AREAS.

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REVISIONS			
NO.	BY	DATE	REMARKS

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL & SITE RESTORATION PLAN NOTES & DETAILS

DATE:	NOVEMBER 2016
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

SHEET 1

SHEET 1 OF 22

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TEMPORARY EROSION AND SEDIMENT CONTROLS INSPECTION AND MAINTENANCE SCHEDULE		
BMP	INSPECTION FREQUENCY	MAINTENANCE TO BE PERFORMED
COMPOST FILTER SOCK	WEEKLY AND AFTER RUNOFF EVENTS	MAINTENANCE SHALL BE PERFORMED AS NEEDED, SEDIMENT SHALL BE REMOVED ONCE IT HAS ACCUMULATED TO ONE HALF THE ORIGINAL HEIGHT OF THE BARRIER. COMPOST FILTER SOCK SHALL BE REPLACED WHENEVER IT HAS DETERIORATED TO SUCH AN EXTENT THAT THE EFFECTIVENESS OF COMPOST FILTER SOCK IS REDUCED. COMPOST FILTER SOCKS SHALL REMAIN IN PLACE UNTIL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED. ALL SEDIMENT ACCUMULATION AT THE COMPOST FILTER SOCK SHALL BE REMOVED AND PROPERLY DISPOSED OF BEFORE THE COMPOST FILTER SOCK IS REMOVED.
ROCK CONSTRUCTION ENTRANCE	DAILY	CONTRACTOR SHALL MAINTAIN/REPLACE MATERIAL AS NEEDED THROUGHOUT CONSTRUCTION TO MAINTAIN EFFECTIVENESS AND SPECIFIED MINIMUM THICKNESS DURING USE OF ACCESS ROAD. A STOCKPILE OF ROCK WILL BE MAINTAINED ON SITE FOR THIS PURPOSE
MULCH STABILIZATION	WEEKLY AND AFTER RUNOFF EVENTS	REPLACE MULCH AS REQUIRED. RESTORE SEEDING IN AFFECTED AREA IF NECESSARY.
TIMBER MAT	WEEKLY AND AFTER RUNOFF EVENTS	INSPECT THE TIMBER MAT FOR EROSION AND MAKE ANY NECESSARY REPAIRS.
WATERBARS	WEEKLY AND AFTER RUNOFF EVENTS	WATERBARS SHALL BE INSPECTED WEEKLY (DAILY ON ACTIVE ROADS) AND AFTER EACH RUNOFF EVENT. DAMAGED OR ERODED WATERBARS SHALL BE RESTORED TO ORIGINAL DIMENSIONS WITHIN 24 HOURS OF INSPECTION.
PUMPED WATER FILTER BAGS	DAILY	FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL OF SEDIMENT. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

STANDARD EROSION AND SEDIMENT CONTROL PLAN NOTES:

1. ALL EARTH DISTURBANCES, INCLUDING CLEARING AND GRUBBING, CUTS, FILLS, TRENCHING, AND TEMPORARY ROAD CONSTRUCTION OR IMPROVEMENT, SHALL BE DONE IN ACCORDANCE WITH AN APPROVED E&S PLAN. A COPY OF THE APPROVED DRAWINGS (STAMPED, SIGNED AND DATED BY THE REVIEWING AGENCY) MUST BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES. THE REVIEWING AGENCY SHALL BE NOTIFIED OF ANY CHANGES TO THE APPROVED PLAN PRIOR TO IMPLEMENTATION OF THOSE CHANGES. THE REVIEWING AGENCY MAY REQUIRE A WRITTEN SUBMITTAL OF THOSE CHANGES FOR REVIEW AND APPROVAL AT ITS DISCRETION.
2. AT LEAST 7 DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, INCLUDING CLEARING AND GRUBBING, THE OWNER AND/OR OPERATOR SHALL INVITE ALL CONTRACTORS, THE LANDOWNER, APPROPRIATE MUNICIPAL OFFICIALS, THE E&S PLAN PREPARER, THE PCSM PLAN PREPARER, THE LICENSED PROFESSIONAL RESPONSIBLE FOR OVERSIGHT OF CRITICAL STAGES OF IMPLEMENTATION OF THE PCSM PLAN, AND A REPRESENTATIVE FROM THE LOCAL CONSERVATION DISTRICT TO AN ON-SITE PRECONSTRUCTION MEETING.
3. AT LEAST 3 DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, OR EXPANDING INTO AN AREA PREVIOUSLY UNMARKED, THE PENNSYLVANIA ONE CALL SYSTEM INC. SHALL BE NOTIFIED AT 1-800-242-1776 FOR THE LOCATION OF EXISTING UNDERGROUND UTILITIES.
4. ALL EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE SEQUENCE PROVIDED ON THE PLAN DRAWINGS. DEVIATION FROM THAT SEQUENCE MUST BE APPROVED IN WRITING FROM THE LOCAL CONSERVATION DISTRICT OR BY THE DEPARTMENT PRIOR TO IMPLEMENTATION.
5. AREAS TO BE FILLED ARE TO BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS AND OTHER OBJECTIONABLE MATERIAL.
6. CLEARING, GRUBBING, AND TOPSOIL STRIPPING SHALL BE LIMITED TO THOSE AREAS DESCRIBED IN EACH STAGE OF THE CONSTRUCTION SEQUENCE. GENERAL SITE CLEARING, GRUBBING AND TOPSOIL STRIPPING MAY NOT COMMENCE IN ANY STAGE OR PHASE OF THE PROJECT UNTIL THE E&S BMPS SPECIFIED BY THE BMP SEQUENCE FOR THAT STAGE OR PHASE HAVE BEEN INSTALLED AND ARE FUNCTIONING AS DESCRIBED IN THIS E&S PLAN.
7. AT NO TIME SHALL CONSTRUCTION VEHICLES BE ALLOWED TO ENTER AREAS OUTSIDE THE LIMIT OF DISTURBANCE BOUNDARIES SHOWN ON THE PLAN MAPS. THESE AREAS MUST BE CLEARLY MARKED AND/OR FENCED OFF BEFORE CLEARING AND GRUBBING OPERATIONS BEGIN.
8. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED AT THE LOCATION(S) SHOWN ON THE PLAN MAPS(S) IN THE AMOUNT NECESSARY TO COMPLETE THE FINISH GRADING OF ALL EXPOSED AREAS THAT ARE TO BE STABILIZED BY VEGETATION. EACH STOCKPILE SHALL BE PROTECTED IN THE MANNER SHOWN ON THE PLAN DRAWINGS. STOCKPILE HEIGHTS SHALL NOT EXCEED 35 FEET. STOCKPILE SLOPES SHALL BE 2H:1V OR FLATTER. SEGREGATION OF TOPSOIL SHALL OCCUR WHERE TOPSOIL EXISTS WITHIN THE WORK AREA.
9. IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE OPERATOR SHALL IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT POLLUTION AND NOTIFY THE LOCAL CONSERVATION DISTRICT AND/OR THE REGIONAL OFFICE OF THE DEPARTMENT.
10. ALL BUILDING MATERIALS AND WASTES SHALL BE REMOVED FROM THE SITE AND RECYCLED OR DISPOSED OF IN ACCORDANCE WITH THE DEPARTMENT'S SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET SEQ., 271.1, AND 287.1 ET. SEQ. NO BUILDING MATERIALS OR WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURNED, BURIED, DUMPED, OR DISCHARGED AT THE SITE.
11. ALL OFF-SITE WASTE AND BORROW AREAS MUST HAVE AN E&S PLAN APPROVED BY THE LOCAL CONSERVATION DISTRICT OR THE DEPARTMENT FULLY IMPLEMENTED PRIOR TO BEING ACTIVATED.
12. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ANY MATERIAL BROUGHT ON SITE IS CLEAN FILL. FORM FP-001 MUST BE RETAINED BY THE PROPERTY OWNER FOR ANY FILL MATERIAL AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE BUT QUALIFYING AS CLEAN FILL DUE TO ANALYTICAL TESTING.
13. ALL PUMPING OF WATER FROM ANY WORK AREA SHALL BE DONE ACCORDING TO THE PROCEDURE DESCRIBED IN THIS PLAN, OVER UNDISTURBED VEGETATED AREAS.

STANDARD EROSION AND SEDIMENT CONTROL PLAN NOTES (CONTINUED):

14. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENT BMPS SHALL BE MAINTAINED PROPERLY. MAINTENANCE SHALL INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENT BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, RE-MULCH AND RE-NETTING MUST BE PERFORMED IMMEDIATELY. IF THE E&S BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPS, OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.
15. NO SOIL AMENDMENTS SUCH AS AGRICULTURAL LIME, FERTILIZER, ETC. WILL BE USED WITHIN WETLAND AREAS.
16. A LOG SHOWING DATES THAT E&S BMPS WERE INSPECTED AS WELL AS ANY DEFICIENCIES FOUND AND THE DATE THEY WERE CORRECTED SHALL BE MAINTAINED ON THE SITE AND BE MADE AVAILABLE TO REGULATORY AGENCY OFFICIALS AT THE TIME OF INSPECTION.
17. SEDIMENT TRACKED ONTO ANY PUBLIC ROADWAY OR SIDEWALK SHALL BE RETURNED TO THE CONSTRUCTION SITE AT THE END OF EACH DAY, OR AS NEEDED, OR AS DIRECTED BY THE CONSERVATION DISTRICT OR LOCAL MUNICIPALITY, AND DISPOSED IN THE MANNER DESCRIBED IN THIS PLAN. IN NO CASE SHALL THE SEDIMENT BE WASHED, SHOVELED, OR SWEPT INTO ANY ROADSIDE DITCH, STORM SEWER, OR SURFACE WATER.
18. ALL SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN THE MANNER DESCRIBED ON THE PLAN DRAWINGS.
19. IN AREAS OF TOPSOIL SEGREGATION THE TOPSOIL SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 3 TO 5 INCHES -- 6 TO 12 INCHES ON COMPACTED SOILS -- PRIOR TO THE RESTORATION OF THE TOPSOIL. AREAS TO BE REVEGETATED SHALL HAVE A MINIMUM 4 INCHES OF TOPSOIL IN PLACE PRIOR TO SEEDING AND MULCHING. FILLOUT SLOPES SHALL HAVE A MINIMUM OF 2 INCHES OF TOPSOIL.
20. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
21. ALL EARTHEN FILLS SHALL BE PLACED IN COMPACTED LAYERS NOT TO EXCEED 8 INCHES IN THICKNESS.
22. FILL MATERIALS SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
23. FROZEN MATERIALS OR SOFT, MUCKY, OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED INTO FILLS.
24. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
25. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.
26. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY UPON REACHING FINISHED GRADE. CUT SLOPES IN COMPETENT BEDROCK AND ROCK FILLS NEED NOT BE VEGETATED. SEEDED AREAS WITHIN 100 FEET OF A SPECIAL PROTECTION SURFACE WATER, OR AS OTHERWISE SHOWN ON THE PLAN DRAWINGS, SHALL BE BLANKETED ACCORDING TO THE STANDARDS OF THIS PLAN.
27. UPON TEMPORARY CESSATION OF AN EARTH DISTURBANCE ACTIVITY OR ANY STAGE OR PHASE OF AN ACTIVITY WHERE CESSATION OF EARTH DISTURBANCE ACTIVITIES IN NON-SPECIAL PROTECTION WATERSHEDS WILL EXCEED 4 DAYS, THE SITE SHALL BE IMMEDIATELY SEEDED, MULCHED OR OTHERWISE PROTECTED FROM ACCELERATED EROSION AND SEDIMENTATION PENDING FUTURE EARTH DISTURBANCE ACTIVITIES IN A SPECIAL PROTECTION WATERSHEDS TEMPORARY STABILIZATION SHALL BE IMMEDIATE.
28. PERMANENT STABILIZATION IS DEFINED AS A MINIMUM UNIFORM, PERENNIAL 70% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED EROSION. CUT AND FILL SLOPES SHALL BE CAPABLE OF RESISTING FAILURE DUE TO SLUMPING, SLIDING, OR OTHER MOVEMENTS.
29. E&S BMPS SHALL REMAIN FUNCTIONAL AS SUCH UNTIL ALL AREAS TRIBUTARY TO THEM ARE PERMANENTLY STABILIZED OR UNTIL THEY ARE REPLACED BY ANOTHER BMP APPROVED BY THE LOCAL CONSERVATION DISTRICT OR THE DEPARTMENT.
30. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT THE LOCAL CONSERVATION DISTRICT FOR AN INSPECTION PRIOR TO REMOVAL/CONVERSION OF THE E&S BMPS.
31. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMPS MUST BE REMOVED OR CONVERTED TO PERMANENT POST CONSTRUCTION STORM WATER MANAGEMENT BMPS. AREAS DISTURBED DURING REMOVAL OR CONVERSION OF THE BMPS SHALL BE STABILIZED IMMEDIATELY. IN ORDER TO ENSURE RAPID REVEGETATION OF DISTURBED AREAS, SUCH REMOVAL/CONVERSIONS ARE TO BE DONE ONLY DURING THE GERMINATING SEASON.
32. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT THE LOCAL CONSERVATION DISTRICT TO SCHEDULE A FINAL INSPECTION.
33. FAILURE TO CORRECTLY INSTALL E&S BMPS, FAILURE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE CONSTRUCTION SITE, OR FAILURE TO TAKE IMMEDIATE CORRECTIVE ACTION TO RESOLVE FAILURE OF E&S BMPS MAY RESULT IN ADMINISTRATIVE, CIVIL, AND/OR CRIMINAL PENALTIES BEING INSTITUTED BY THE DEPARTMENT AS DEFINED IN SECTION 602 OF THE PENNSYLVANIA CLEAN STREAMS LAW. THE CLEAN STREAMS LAW PROVIDES FOR UP TO$10,000 PER DAY IN CIVIL PENALTIES, UP TO $10,000 IN SUMMARY CRIMINAL PENALTIES, AND UP TO $25,000 IN MISDEMEANOR CRIMINAL PENALTIES FOR EACH VIOLATION.
34. ALL CHANNELS SHALL BE KEPT FREE OF OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO FILL, ROCKS, LEAVES, WOODY DEBRIS, ACCUMULATED SEDIMENT, EXCESS VEGETATION, AND CONSTRUCTION MATERIAL/WASTES.
35. UNDERGROUND UTILITIES CUTTING THROUGH ANY ACTIVE CHANNEL SHALL BE IMMEDIATELY BACKFILLED AND THE CHANNEL RESTORED TO ITS ORIGINAL CROSS-SECTION AND PROTECTIVE LINING. ANY BASE FLOW WITHIN THE CHANNEL SHALL BE CONVEYED PAST THE WORK AREA IN THE MANNER DESCRIBED IN THIS PLAN UNTIL SUCH RESTORATION IS COMPLETE.
36. EROSION CONTROL BLANKETING SHALL BE INSTALLED ON ALL SLOPES 3H:1V OR GREATER AND ALL AREAS, REGARDLESS OF SLOPE WITHIN 50 FEET OF NON-SPECIAL PROTECTION AND 100 FEET OF A SPECIAL PROTECTION SURFACE WATER AND ON ALL OTHER DISTURBED AREAS SPECIFIED ON THE PLAN MAPS AND/OR DETAIL SHEETS.
37. UPON COMPLETION OR TEMPORARY CESSATION OF THE EARTH DISTURBANCE ACTIVITY IN A SPECIAL PROTECTION WATERSHED, THAT PORTION OF THE PROJECT SITE TRIBUTARY TO THE SPECIAL PROTECTION WATERS MUST BE IMMEDIATELY STABILIZED.
38. IF COAL OR OTHER ACID-PRODUCING ROCK IS ENCOUNTERED AT THE PROJECT SITE, THE ACID PRODUCING ROCK WILL EITHER BE REMOVED FROM THE SITE OR HANDLED ONSITE. IF COAL OR OTHER ACID-PRODUCING ROCK MUST BE HANDLED ON SITE IS SHOULD BE SAMPLED AND ANALYZED FOR TOTAL PERCENT SULFUR IN ACCORDANCE WITH PADEPS GUIDANCE. ON-SITE HANDLING METHODS SHOULD BE BASED ON TESTING AND PADEP GUIDANCE.
39. IF A SINKHOLE IS ENCOUNTERED, REPAIR SHOULD BE DONE UNDER THE DIRECT OBSERVATION AND SUPERVISION OF A PROFESSIONAL GEOLOGIST OR LICENSED GEOTECHNICAL ENGINEER. SITE SPECIFIC SINKHOLE REPAIRS SHOULD BE DEVELOPED ON A CASE BY CASE BASIS.
40. IN-STREAM WORK TO OCCUR IN MINOR WATER BODIES (>10 FEET WIDE) WITHIN 24 HOURS, AND IN MAJOR WATER BODIES (10 TO 100 FEET WIDE) WITHIN 48 HOURS UNLESS APPROVED IN WRITING BY THE DEPARTMENT.

CONSTRUCTION SEQUENCE:

REFER TO THE E&SC PLAN DRAWINGS FOR THE LOCATION OF THE PROPOSED WORK AND THE ASSOCIATED BMPS. A GENERALIZED CONSTRUCTION SEQUENCE IS PROVIDED BELOW. THE CONSTRUCTION SEQUENCE IS INTENDED TO PROVIDE A GENERAL COURSE OF ACTION IN ORDER TO CONFORM TO THE APPLICABLE REGULATORY AGENCY REQUIREMENTS FOR TEMPORARY AND PERMANENT SOIL EROSION AND SEDIMENTATION CONTROLS. NECESSARY PARTS FOR PROPER AND COMPLETE EXECUTION OF WORK PERTAINING TO THIS PLAN, WHETHER SPECIFICALLY MENTIONED OR NOT, ARE TO BE PERFORMED BY THE CONTRACTOR. IT IS NOT INTENDED THAT THE DRAWINGS AND THIS REPORT SHOW DETAILED INFORMATION ON METHODS AND MATERIALS. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS LISTED IN THIS SECTION. THE CONTRACTOR MAY BE REQUIRED TO ALTER CONTROLS BASED ON EFFECTIVENESS OF CONTROLS OR DIFFERING CONDITIONS ENCOUNTERED IN THE FIELD.

1. MAKE ALL APPROPRIATE NOTIFICATIONS AS INDICATED IN GENERAL NOTES ON PLAN SHEET ES-0.01.
2. FLAG OR FENCE PROJECT LIMITS OF DISTURBANCE AND APPROVED ACCESS. SIGN AND FLAG WETLAND BOUNDARIES AND STREAMS.
3. ORANGE CONSTRUCTION FENCE WILL BE PROVIDED AND INSTALLED AT WETLAND AREAS ADJACENT TO THE LOD AND NOT PLANNED TO BE IMPACTED TO IDENTIFY AND DETER CONSTRUCTION EQUIPMENT, VEHICLES AND PERSONNEL FROM ENTERING WETLAND.
4. LOCATE STAGING AREAS AND ACCESS POINTS INCLUDING CONSTRUCTION ENTRANCES. INSTALL COMPOST FILTER SOCKS DOWN SLOPE OF THESE AREAS.
5. INSTALL ROCK CONSTRUCTION ENTRANCES AS NEEDED. REFER TO THE ROCK CONSTRUCTION ENTRANCE DETAIL ON PLAN SHEET ES-0.05.
6. CONSTRUCT THE PROPOSED ACCESS ROADS AND IMPLEMENT TEMPORARY IMPROVEMENTS AS IDENTIFIED IN ACCESS ROAD SUMMARY TABLE AND DETAILED ON THE PLAN SHEETS.
7. INSTALL COMPOST FILTER SOCKS AS SHOWN ON THE CONSTRUCTION DRAWINGS. INSTALLATIONS SIZING, AND SPACING MUST CONFORM TO THE CHART AND DETAILS PROVIDED ON PLAN SHEET ES-0.05. APPROPRIATELY SIZED SILT FENCE IS AN APPROVED ALTERNATIVE IN AREAS THAT ARE NOT SPECIAL PROTECTION WATERSHEDS AND MUST CONFORM TO THE CHART AND DETAILS PROVIDED ON PLAN SHEET ES-0.06.
8. CLEARING, GRUBBING, AND TOPSOIL STRIPPING SHALL COMMENCE ALONG THE PIPELINE ROUTE AND BE LIMITED TO THOSE AREAS DESCRIBED IN EACH STAGE OF THE CONSTRUCTION SEQUENCE. GENERAL SITE CLEARING, GRUBBING AND TOPSOIL STRIPPING MAY NOT COMMENCE IN ANY STAGE OR PHASE OF THE PROJECT UNTIL THE E&S BMPS SPECIFIED BY THE BMP SEQUENCE FOR THAT STAGE OR PHASE HAVE BEEN INSTALLED AND ARE FUNCTIONING AS DESCRIBED IN THIS E&S PLAN. FOR CLEARING, GRUBBING, AND TOPSOIL REMOVAL IN ALL STREAM, RIVER, WETLAND OR OTHER WATER BODY CROSSINGS, REFER TO CONSTRUCTION SEQUENCE NOTES BELOW. TOPSOIL WILL BE SEGREGATED AT LOCATIONS THROUGHOUT THE PROJECT WHERE TOPSOIL EXISTS.
9. TEMPORARY WATERBARS OR APPROVED INTERCEPTOR DYKES WILL BE INSTALLED ALONG THE ALIGNMENT PRIOR TO PIPE INSTALLATION AT THE END OF EACH WORK DAY. DURING THE PERIODS OF TIME WHERE PIPE TRENCH IS OPEN CONTRACTORS WILL PROVIDE POSITIVE CONTROL OF ALL STORM WATER ON SITE, TEMPORARY WATERBARS WILL BE CONSTRUCTED BY THE END THE WORK DAY, OR DURING EACH WORK DAY IF REQUIRED CONTRACTOR WILL INSTALL SILT FENCE TO CONTROL EROSION UNTIL 70% VEGETATION GROWTH HAS BEEN ACHIEVED.
10. MINIMIZE TOTAL AREA OF DISTURBANCE. MAINTAIN TEMPORARY SOIL STOCKPILES WITHIN EXISTING SOIL EROSION AND SEDIMENT CONTROLS. SHOULD EXCAVATION ENTER STREAMS, FOLLOW SPECIFIC DETAILS FOR THESE AREAS SHOWN ON THE DRAWINGS AND INCLUDE THE STEPS DETAILED IN THE SPECIFIC SECTIONS BELOW. PULLBACK AREAS FOR HDDS WILL BE CLEARED AND PREPARED AS NEEDED TO SUPPORT STAGING, WELDING AND TESTING OF THE HDD PIPE SECTIONS. AREAS NOT UTILIZED FOR CONSTRUCTION ACTIVITIES SHOULD BE AVOIDED TO MINIMIZE IMPACTS.
11. INSTALL PIPE AND TRENCH PLUGS IN ACCORDANCE WITH DETAILS ON PLAN SHEET ES-0.07. WHEN OPEN CUTTING DRIVEWAYS AND ACCESS ROADS, CONTRACTOR SHALL HAVE ROAD PLATES AVAILABLE TO MAINTAIN ACCESS FOR LANDOWNERS. THE 20-INCH PIPELINE WILL BE INSTALLED FIRST, FOLLOWED BY THE 16-INCH LINE. ANY TEMPORARY STABILIZATION REQUIRED BETWEEN THE TWO INSTALLATIONS WILL BE IMPLEMENTED IN ACCORDANCE WITH THIS E&S PLAN. BOTH PIPELINES WILL BE INSTALLED WITHIN THE SAME LIMIT OF DISTURBANCE AND IN THE SAME CONSTRUCTION PERIOD.
12. FOR OPEN-CUT AREAS, THE LENGTH OF TIME REQUIRED TO CLEAR AND GRADE THE AREA, EXCAVATE THE TRENCH, INSTALL THE PIPELINES, BACKFILL THE TRENCH AND BEGIN STABILIZATION OF DISTURBED AREAS WILL NOT EXCEED 30 CALENDAR DAYS FOR MOST INSTALLATIONS. LONGER TIME PERIODS MAY BE APPROVED ON A CASE-BY-CASE BASIS.
13. BACKFILL EXCAVATED AREA AND COVER WITH TOPSOIL (WHERE TOPSOIL WAS SEGREGATED).
14. BEFORE RESTORATION OF GRADE, THE SECOND 16-INCH PIPELINE WILL BE INSTALLED. ALL TEMPORARY BMPS WILL BE IMPLEMENTED BETWEEN THE TWO INSTALLATIONS IN ACCORDANCE WITH THE NOTES AND DETAILS FOR TEMPORARY SEEDING AND COVER.
15. RESTORE GRADE TO ORIGINAL SURFACE ELEVATIONS AS SOON AS PRACTICABLE FOLLOWING COMPLETION OF INSTALLATION OF PIPES. INSTALL PERMANENT WATERBARS IN ACCORDANCE WITH PLAN SHEET ES-0.08. IMMEDIATELY SEED AND MULCH DISTURBED AREAS OR PREPARE FOR PAVING IN ROADWAY AREAS.
16. INSTALL EROSION CONTROL BLANKET ON ALL SLOPES 3:1 OR GREATER AND ALL AREAS, REGARDLESS OF SLOPE AND WITHIN 100 FEET OF SPECIAL PROTECTION WATERS OR 50 FEET OF NON-SPECIAL PROTECTION SURFACE WATERS. LOCATIONS ARE SHOWN ON PLAN SHEETS.
17. IN AREAS THAT USED STONE OR TIMBER MATS FOR TEMPORARY STABILIZATION AND/OR ACCESS, THE STONE OR MATS WILL BE REMOVED AND, IF NEEDED, THE SOIL WILL BE SCARIFIED OR RIPPED TO A DEPTH OF 8-12 INCHES TO DE-COMPACT THE SOIL. AFTER REESTABLISHING PRECONSTRUCTION CONTOURS, TOPSOIL WILL BE REPLACED TO A MINIMUM DEPTH OF 4-8 INCHES AND SEEDED AND MULCHED. VEHICULAR TRAFFIC AFTER RESTORATION SHOULD BE RESTRICTED FROM AREAS TO PREVENT SOIL COMPACTION.
18. MAINTAIN EROSION AND SEDIMENTATION CONTROL DEVICES UNTIL SITE WORK IS COMPLETE AND A UNIFORM 70% PERENNIAL VEGETATIVE COVER IS ESTABLISHED. REMOVE SOIL AND EROSION SEDIMENT CONTROL MEASURES UPON ESTABLISHMENT OF A UNIFORM 70% PERENNIAL VEGETATIVE COVERAGE OVER THE DISTURBED AREA. RE-GRADE AND REVEGETATE AREAS DISTURBED DURING THE REMOVAL OF THE SOIL EROSION AND SEDIMENT CONTROLS.
19. AS PART OF THE ONGOING STORM WATER BMP INSPECTION AND MAINTENANCE PROGRAM ANY STRUCTURAL BMP RECORDED ON THIS PROJECT WILL BE INSPECTED MAINTAINED, AND REPAIRED IN ACCORDANCE WITH THE PLAN FILED WITH THE DEED.
20. IN ACCORDANCE WITH 25 PA CODE 102.7, UPON COMPLETION OF ALL CONSTRUCTION ACTIVITIES, A NOTICE OF TERMINATION FORM WILL BE SUBMITTED TO TERMINATE THE AUTHORIZATION OF COVERAGE INDICATING ALL ACTIVITIES UNDER THIS PERMIT HAVE BEEN COMPLETED.
21. FOR ALL EV WETLAND AND STREAM CROSSINGS, SPLP WILL INSTALL THE SECOND PIPELINE IMMEDIATELY FOLLOWING THE INSTALLATION OF THE FIRST PIPELINE, AS LONG AS NO UNANTICIPATED, EXTRANEOUS CIRCUMSTANCES OR SAFETY ISSUES ARE ENCOUNTERED. THE TWO PIPES WILL BE INSTALLED IN A SINGLE DISTURBANCE THAT WILL NOT REQUIRE INTERIM TEMPORARY STABILIZATION/RESTORATION.

FOR STREAM, RIVER, WETLANDS OR OTHER WATER BODY UTILITY CROSSINGS THAT WILL BE OPEN CUT:

1. NO WORK SHALL COMMENCE THROUGH A STREAM, RIVER, WETLANDS OR OTHER WATER BODY DURING INCLEMENT WEATHER.
2. A UTILITY LINE CROSSING OF A STREAM CHANNEL 10 FEET IN BOTTOM WIDTH OR LESS SHALL BE COMPLETED WITHIN 24 HOURS FROM START TO FINISH INCLUDING TRENCH BACKFILL, STABILIZATION OF STREAM BANKS AND STABILIZATION OF THE AREA 50 FEET BACK FROM THE TOP OF EACH STREAM BANK.
3. A UTILITY LINE CROSSING OF A STREAM CHANNEL BETWEEN 10 FEET AND 100 FEET IN BOTTOM WIDTH SHALL BE COMPLETED WITHIN 48 HOURS FROM START TO FINISH INCLUDING TRENCH BACKFILL, STABILIZATION OF STREAM BANKS AND STABILIZATION OF THE AREA 50 FEET BACK FROM THE TOP OF EACH STREAM BANK.
4. WETLAND CROSSINGS ARE TO BE COMPLETED ALONG WITH THE MAINLINE INSTALLATION AND WILL BE DEPENDENT UPON THE LENGTH OF THE CROSSING.
5. FACILITIES FOR REMOVING SEDIMENT FROM PUMPED WATER SHOULD BE AVAILABLE AT THE STREAM CROSSING SITE BEFORE TRENCHING COMMENCES AND MAINTAINED UNTIL TRENCH BACKFILLING IS COMPLETED. ASSEMBLY AREAS, TEMPORARY EQUIPMENT AND NON-HAZARDOUS MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 50 FEET BACK FROM THE TOP OF ANY BANK.
6. INSTALL TEMPORARY EQUIPMENT CROSSINGS AT STREAMS AND TEMPORARY TIMBER MATS AT WETLAND CROSSINGS IN ACCORDANCE WITH NOTES AND DETAILS.
7. FOR DRY STREAM CROSSINGS INSTALL PUMP BYPASS, DRY FLUME, OR COFFERDAM IN ACCORDANCE WITH NOTES AND DETAILS.
8. DEWATERING WORK AREA. WATER FROM THE EXCAVATION SHALL BE PUMPED TO A SEDIMENT FILTER BAG. WHERE POSSIBLE, EXCAVATION SHALL BE FROM THE TOP OF THE STREAM BANK, WHERE TECHNICALLY FEASIBLE.
9. STABILIZE CHANNEL EXCAVATION AND STREAM BANKS PRIOR TO REDIRECTING STREAM FLOW.

FOR CONVENTIONAL AND HDD BORE CROSSINGS:

CONVENTIONAL BORES

1. CONVENTIONAL BORES WILL BE CONDUCTED ALONG WITH MAIN LINE INSTALLATION TO LIMIT THE TIME OF DISTURBANCE IN THOSE AREAS.
2. INSTALL COMPOST FILTER SOCKS DOWNGRADIENT OF THE BORE AND RECEIVING PITS.
3. EXCAVATE PITS AS SHOWN IN THE TYPICAL STREAM CROSSING DETAIL ON PLAN SHEET ES-0.17
4. BORE BENEATH STREAMS WHERE INDICATED ON THE CONSTRUCTION DRAWINGS.
5. WATER FROM THE BORE PITS AND WORK AREAS SHALL BE PUMPED TO A PUMPED WATER FILTER BAG IN ACCORDANCE WITH DETAIL ON PLAN SHEET ES-0.07.
6. UPON COMPLETION, BACKFILL ALL PITS.

HDD BORES

1. INSTALL COMPOST FILTER SOCKS AT STAGING AND PULLBACK AREAS IN ACCORDANCE WITH E&S PLAN SHEETS. WHERE APPLICABLE TEMPORARY GRADING OF STAGING AREAS IS PROVIDED ON PLAN SHEETS.
2. BORE AND PULLBACK AREAS SHALL BE LOCATED A MINIMUM OF 50 FEET BACK FROM EACH TOP OF STREAM BANK UNLESS AUTHORIZED BY PADEP.
3. THE HDD BORE ALIGNMENT SHALL BE MONITORED FOR INADVERTENT RETURNS. AN INADVERTENT RETURN PLAN HAS BEEN DEVELOPED FOR THIS PROJECT. THIS PLAN IS TO BE REVIEWED, ONSITE, AND IMPLEMENTED FOR EACH DRILL CONDUCTED.
4. UPON COMPLETION OF HDD BORE, RESTORE BORE AND PULLBACK AREAS TO PRE-CONSTRUCTION CONDITIONS IN ACCORDANCE WITH E&S PLANS AND DETAILS.

FOR WORKING WITHIN A WETLAND AREA:

1. LOCATE STAGING AREAS AND ACCESS POINTS. STAGING AREAS SHOULD BE LOCATED AT LEAST 50 FEET FROM THE EDGE OF THE WETLAND. INSTALL SEDIMENT BARRIERS DOWN SLOPE OF THESE AREAS.
2. INSTALL ROCK CONSTRUCTION ENTRANCE AS NEEDED. REFER TO THE ROCK CONSTRUCTION ENTRANCE DETAIL ON DRAWINGS FOR SUGGESTED DIMENSIONS.
3. INSTALL ORANGE FLAGGING AROUND PERIMETER OF WETLAND AND SEDIMENT BARRIERS ALONG THE PERIMETERS OF THE SITE AS SHOWN ON THE CONSTRUCTION DRAWINGS.
4. MATS, PADS, OR SIMILAR DEVICES SHALL BE USED DURING THE CROSSINGS OF WETLANDS. ORIGINAL GRADES THROUGH WETLANDS MUST BE RESTORED AFTER TRENCHING AND BACKFILLING. ANY EXCESS FILL MATERIALS MUST BE REMOVED FROM THE WETLAND AND NOT SPREAD ON-SITE.
5. SOIL EXCAVATED FROM WETLAND AREAS SHALL BE CAREFULLY REMOVED WITH THE ROOTS INTACT. THIS SOIL SHOULD BE PLACED IN A SEPARATE STOCKPILE TO BE REUSED DURING THE WETLAND SURFACE RESTITUTION.
6. DEWATER WORK AREA; WATER FROM THE EXCAVATION SHALL BE PUMPED TO A SEDIMENT TRAP OR A FILTER BAG.
7. INSTALL PIPE.
8. INSTALL TRENCH PLUGS IN WETLAND AREAS TO PREVENT THE TRENCH FROM DRAINING THE WETLAND OR CHANGING ITS HYDROLOGY.
9. BACKFILL PIPE TRENCH. BACKFILL THE TOP 12-INCHES OF THE EXCAVATED TRENCH WITH THE STOCKPILED WETLAND SOIL TO MATCH ORIGINAL SURFACE GRADES.
10. NO SOIL AMENDMENTS SUCH AS AGRICULTURAL LIME, FERTILIZER, ETC. WILL BE USED WITHIN WETLAND AREAS.
11. COMPACT BACKFILL AND GRADE THE SURFACE OF THE TRENCH AREA TO ALLOW FOR POSITIVE DRAINAGE TO SOIL EROSION AND SEDIMENT CONTROLS AND TO PREPARE DISTURBED AREAS FOR PERMANENT TRENCH RESTORATION.
12. MAINTAIN ALL EROSION AND SEDIMENTATION CONTROL DEVICES UNTIL SITE WORK IS COMPLETE AND A UNIFORM 70% PERENNIAL VEGETATIVE COVER IS ESTABLISHED.
13. REMOVE ALL SOIL AND EROSION SEDIMENT CONTROL MEASURES UPON ESTABLISHMENT OF A UNIFORM 70% VEGETATIVE COVER OVER THE DISTURBED AREA. RE-GRADE AND REVEGETATE AREAS DISTURBED DURING THE REMOVAL OF THE SOIL EROSION AND SEDIMENT CONTROLS.

FOR TEMPORARY EQUIPMENT STREAM AND WETLAND CROSSINGS:

1. INSTALL TEMPORARY EQUIPMENT CROSSINGS AND TEMPORARY TIMBER MAT WETLAND CROSSINGS IN ACCORDANCE WITH PLAN SHEETS ES-0.10.
2. TEMPORARY STREAM CROSSINGS SHALL BE INSPECTED ON A DAILY BASIS. DAMAGED CROSSINGS SHALL BE REPAIRED WITHIN 24 HOURS OF THE INSPECTION AND BEFORE ANY SUBSEQUENT USE. SEDIMENT DEPOSITS ON THE CROSSING OR ITS APPROACHES SHALL BE REMOVED WITHIN 24 HOURS OF THE INSPECTION.
3. AS SOON AS THE TEMPORARY CROSSING IS NO LONGER NEEDED, REMOVE TEMPORARY CROSSING. ALL MATERIALS SHALL BE DISPOSED OF PROPERLY AND DISTURBED AREAS STABILIZED. REMOVE ALL SOIL AND EROSION SEDIMENT CONTROL MEASURES UPON ESTABLISHMENT OF A UNIFORM 70% VEGETATION COVER OVER THE DISTURBED AREA.

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REVISIONS			
NO.	BY	DATE	REMARKS

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL & SITE RESTORATION PLAN NOTES & DETAILS

DATE:	NOVEMBER 2016
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

SHEET 2
SHEET 2 OF 22

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TEMPORARY REVEGETATION

TEMPORARY GRASS COVER SHALL BE ESTABLISHED IN THE FOLLOWING AREAS:

1. UPON TEMPORARY CESSATION OF AN EARTH DISTURBANCE ACTIVITY OR ANY STAGE OR PHASE OF AN ACTIVITY WHERE CESSATION OF EARTH DISTURBANCE ACTIVITIES IN NON-SPECIAL PROTECTION WATERSHEDS WILL EXCEED 4 DAYS, THE SITE SHALL BE IMMEDIATELY SEEDED, MULCHED OR OTHERWISE PROTECTED FROM ACCELERATED EROSION AND SEDIMENTATION PENDING FUTURE EARTH DISTURBANCE ACTIVITIES. IN A SPECIAL PROTECTION WATERSHED TEMPORARY STABILIZATION SHALL BE IMMEDIATE.
2. WHERE SOIL STOCKPILES ARE TO BE EXPOSED FOR A PERIOD GREATER THAN FOUR (4) DAYS, THE STOCKPILE SHALL BE SEEDED.
3. WHERE VEGETATIVE FILTERS MUST BE ESTABLISHED BELOW FILTER BAGS, A MINIMUM DISTANCE OF 10 FT SHALL BE SEEDED DOWN SLOPE OF THE TRAP OUTLET.
4. SEED MIXTURE FOR TEMPORARY COVER SHALL CONSIST OF 100% ANNUAL RYEGRASS. SEED SHALL BE APPLIED AT THE RATE OF 40 LB/ACRE OR AS RECOMMENDED BY A LOCAL RECOGNIZED SEED SUPPLIER APPROVED BY THE OWNER'S REPRESENTATIVE. UNLESS EXPLICITLY RESTRICTED (E.G., WETLANDS) PRIOR TO SEEDING, APPLY 1 TON OF AGRICULTURAL GRADE LIMESTONE PER ACRE PLUS 10-10-10 FERTILIZER AT THE RATE OF 500 LB. PER ACRE AND WORK INTO SOIL.
5. TEMPORARY REVEGETATION CAN ALSO BE USED DURING UNFAVORABLE GROWING SEASON FOR PERMANENT MIXES. APPLY PERMANENT SEEDING DURING FIRST FAVORABLE GROWING SEASON.

MULCHING

THE PURPOSE OF MULCH IS TO REDUCE RUNOFF AND EROSION, PREVENT SURFACE COMPACTION OR CRUSTING, CONSERVE MOISTURE, AID IN ESTABLISHING PLANT COVER, AND CONTROL WEEDS. MULCH SHALL BE APPLIED ON ANY AREA SUBJECT TO EROSION, OR WHICH HAS UNFAVORABLE CONDITIONS FOR PLANT ESTABLISHMENT AND GROWTH. THE PRACTICE MAY BE USED ALONE OR IN CONJUNCTION WITH OTHER STRUCTURAL AND VEGETATIVE CONSERVATION PRACTICES, SUCH AS WATERWAYS, PONDS, SEDIMENTATION TRAPS OR CRITICAL AREA PLANTING. ON SEDIMENT PRODUCING AREAS WHERE THE PERIOD OF EXPOSURE IS LESS THAN TWO (2) MONTHS, MULCH MATERIALS SHALL BE APPLIED ACCORDING TO THE FOLLOWING GUIDELINES:

1. STRAW MULCH SHALL BE APPLIED AT THE RATE OF THREE TONS PER ACRE. CHEMICALLY TREATED OR SALTED STRAW IS NOT ACCEPTABLE AS MULCH.
2. STRAW MULCH SHALL BE ANCHORED IMMEDIATELY AFTER APPLICATION BY AT LEAST ONE OF THE FOLLOWING METHODS.
   a. "CRIMPED" INTO THE SOIL USING TRACTOR DRAWN EQUIPMENT (STRAIGHT BLADED COULTER OR SIMILAR). THIS METHOD IS LIMITED TO SLOPES NO STEEPER THAN 3:1. MACHINERY SHOULD BE OPERATED ON THE CONTOUR. (CRIMPING OF HAY OR STRAW BY RUNNING IT OVER WITH TRACKED MACHINERY IS NOT RECOMMENDED)
   b. ASPHALT, EITHER EMULSIFIED OR CUT-BACK, CONTAINING NO SOLVENTS OR OTHER DILUTING AGENTS TOXIC TO PLANT OR ANIMAL LIFE, UNIFORMLY APPLIED AT THE RATE OF 31 GALLONS PER 1000 FT2.
   c. SYNTHETIC BINDERS (CHEMICAL BINDERS) MAY BE USED AS RECOMMENDED BY THE MANUFACTURER TO ANCHOR MULCH PROVIDED SUFFICIENT DOCUMENTATION IS PROVIDED TO SHOW THAT IT IS NON-TOXIC TO NATIVE PLANT AND ANIMAL SPECIES.
   d. LIGHTWEIGHT PLASTIC, FIBER, OR PAPER NETS MAY BE STAPLED OVER THE MULCH ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

MULCHED AREAS SHALL BE CHECKED PERIODICALLY AND AFTER EACH RUNOFF EVENT (E.G. RAIN, SNOWMELT, ETC.) FOR DAMAGE UNTIL THE DESIRED PURPOSE OF THE MULCHING IS ACHIEVED. DAMAGED PORTIONS OF THE MULCH OR TIE-DOWN MATERIAL SHALL BE REPAIRED UPON DISCOVERY.

PERMANENT REVEGETATION

SEEDING MIXTURES

FOLLOW WITH RECOMMENDED SEED MIXTURE TABLE AND NOTES, THEN PENNDOT FORMULA, THEN WETLAND, THEN APPLICATION GUIDANCE, THEN RATES, THEN NOTES.

LIMING RATES

MINIMUM 6 TONS PER ACRE AT 100% EFFECTIVE NEUTRALIZING VALUE (%ENV), UNLESS THE SOIL TEST DETERMINES THAT A LESSER AMOUNT IS NEEDED. TO DETERMINE THE ACTUAL AMOUNT OF REGULAR LIME TO APPLY, DIVIDE THE AMOUNT CALLED FOR BY THE SOIL TEST BY THE %ENV FOR THE PRODUCT USED. FOR EXAMPLE, IF 6 TONS PER ACRE IS NEEDED AND THE %ENV FOR THE LIME USED IS 88%, DIVIDE 6 BY 0.88 RESULTING IN 6.8 TONS NEEDING TO BE APPLIED.

FOR DOLOMITIC LIME, WHICH HAS A SIGNIFICANT AMOUNT OF MAGNESIUM IN IT, DIVIDE THE AMOUNT CALLED FOR BY THE SOIL TEST BY THE % CALCIUM CARBONATE EQUIVALENT (%CCE) LISTED FOR THE PRODUCT INSTEAD OF THE %ENV. THE %CCE MAY BE ABOVE 100% WHICH ACCOUNTS FOR THE FACT THAT MAGNESIUM HAS A GREATER EFFECT PER POUND THAN THE CALCIUM IN REGULAR LIME.

NOTE: WHEN A SOIL TEST REQUIRES MORE THAN 8,000 POUNDS OF LIME PER ACRE, THE LIME MUST BE MIXED INTO THE TOP 6 INCHES OF SOIL.

FERTILIZATION RATES

APPLY 10-20-20 AT 600 POUNDS/ACRE, IF TOP DRESSED OR 1,000 POUNDS/AC, IF INCORPORATED, UNLESS THE SOIL TEST DETERMINES THAT THE RATE CAN BE LESS THAN THESE MINIMUMS.

SOIL AMENDMENT APPLICATION RATE EQUIVALENTS

SOIL AMENDMENT	PER ACRE	PER 1,000 SQ. FT.	PER 1,000 SQ. YDS.	NOTES
PERMANENT SEEDING APPLICATION RATE				
AGRICULTURAL LIME	6 TONS	240 LBS.	2,480 LBS.	OR AS PER SOIL TEST; MAY NOT BE REQUIRED IN AGRICULTURAL FIELDS
10-20-20 FERTILIZER	1,000 LBS.	25 LBS.	210 LBS.	OR AS PER SOIL TEST; MAY NOT BE REQUIRED IN AGRICULTURAL FIELDS

MULCH APPLICATION RATES

MULCH TABLE	APPLICATION RATE (MINIMUM) PER ACRE	PER 1,000 SQ. FT.	PER 1,000 SQ. YDS.	NOTES
STRAW	3 TONS	140 LBS.	1,240 LBS.	EITHER WHEAT OR OAT STRAW, FREE OF WEEDS, NOT CHOPPED OR FINELY BROKEN
HAY	3 TONS	140 LBS.	1,240 LBS.	TIMOTHY, MIXED CLOVER AND TIMOTHY OR OTHER NATIVE FORAGE GRASSES
WOODCHIPS	4 TO 6 TONS	185 TO 275 LBS.	1,650 TO 2,500 LBS.	MAY PREVENT GERMINATION OF GRASSES AND LEGUMES
HYDROMULCH	1 TON	47 LBS.	415 LBS.	SEE LIMITATIONS ABOVE

RECOMMENDED SEED MIXTURES

MIXTURE NO.	SPECIES	SEEDING RATES – PLS(1) MOST SITES	ADVERSE SITES
1 (2)	SPRING OATS (SPRING), OR 64 96	64	96
	ANNUAL RYEGRASS (SPRING OR FALL), OR	10	15
	WINTER WHEAT (FALL), OR	90	120
	WINTER RYE (FALL)	56	112
2 (3)	TALL FESCUE, OR 75	60	75
	FINE FESCUE, OR 40	35	40
	KENTUCKY BLUEGRASS, PLUS 25 30	25	30
	REDTOP(4), OR	3	3
	PERENNIAL RYEGRASS	15	20
3	BIRDSFOOT TREFOIL, PLUS 6 10	6	10
	TALL FESCUE	30	35
4	BIRDSFOOT TREFOIL, PLUS	6	10
	REED CANARYGRASS	10	15
5 (5)	BIG BLUESTEM, PLUS	10	15
	TALL FESCUE, OR	20	25
	PERENNIAL RYEGRASS	20	25
6 (5,6)	BIG BLUESTEM, PLUS	10	15
	ANNUAL RYEGRASS	20	25
7 (5)	BIRDSFOOT TREFOIL, PLUS	20	30
	BIG BLUESTEM, PLUS	20	30
	TALL FESCUE	20	25
8	FLATPEA, PLUS	20	30
	TALL FESCUE, OR	20	30
	PERENNIAL RYEGRASS	20	25
9 (7)	SERECIA LESPEDEZA, PLUS	10	20
	TALL FESCUE, PLUS	20	25
	REDTOP(4)	3	3
10	TALL FESCUE, PLUS	40	60
	FINE FESCUE	10	15
11	DEERTONGUE, PLUS	15	20
	BIRDSFOOT TREFOIL	6	10
12(8)	SWITCHGRASS, OR	15	20
	BIG BLUESTEM, PLUS	15	20
	BIRDSFOOT TREFOIL	6	10
13	ORCHARDGRASS, OR	20	30
	SMOOTH BROMEGRASS, PLUS	25	35
	BIRDSFOOT TREFOIL	6	10

NOTES:

1. PURE LIVE SEED (PLS) IS THE PRODUCT OF THE PERCENTAGE OF PURE SEED TIMES PERCENTAGE GERMINATION DIVIDED BY 100. FOR EXAMPLE, TO SECURE THE ACTUAL PLANTING RATE FOR SWITCHGRASS, DIVIDE 12 POUNDS PLS SHOWN ON THE SEED TAG. THUS, IF THE PLS CONTENT OF A GIVEN SEED LOT IS 35 PERCENT, DIVIDE 12 PLS BY 0.35 TO OBTAIN 34.3 POUNDS OF SEED REQUIRED TO PLANT ONE-ACRE. ALL MIXTURES IN THIS TABLE ARE SHOWN IN TERMS OF PLS.
2. IF HIGH-QUALITY SEED IS USED, FOR MOST SITES SEED SPRING OATS AT A RATE OF TWO BUSHELS PER ACRE, WINTER WHEAT AT 11.5 BUSHELS PER ACRE, AND WINTER RYE AT ONE BUSHEL PER ACRE. IF GERMINATION IS BELOW 90 PERCENT, INCREASE THESE SUGGESTED SEEDING RATES BY 0.5 BUSHEL PER ACRE.
3. THIS MIXTURE IS SUITABLE FOR FREQUENT MOWING. DO NOT CUT SHORTER THAN FOUR INCHES.
4. KEEP SEEDING RATE TO THAT RECOMMENDED IN TABLE. THESE SPECIES HAVE MANY SEEDS PER POUND AND ARE VERY COMPETITIVE. TO SEED SMALL QUANTITIES OF SMALL SEEDS SUCH AS WEEPING LOVEGRASS AND REDTOP, DILUTE WITH DRY SAWDUST, SAND, RICE HULLS, BUCKWHEAT HULLS, ETC.
5. USE FOR HIGHWAY SLOPES AND SIMILAR SITES WHERE THE DESIRED SPECIES AFTER ESTABLISHMENT IS BIG BLUESTEM.
6. USE ONLY IN EXTREME SOUTHEASTERN OR EXTREME SOUTHWESTERN PA. SERECIA LESPEDEZA IS NOT WELL ADAPTED TO MOST OF PA.
7. DO NOT MOW SHORTER THAN NINE TO 10 INCHES.

PENN DOT FORMULA B

SEEDING RATE	3 LBS PER 1,000 SQ FT			
SPECIES	% BY WT.	PURITY %	MIN. % GERMINATION	MAX. % WEED SEED
KENTUCKY BLUEGRASS	50	98	80	0.20
PERENNIAL RYE	20	98	90	0.15
RED FESCUE	30	98	85	0.15

SEED MIX APPLICATION GUIDE

SITE CONDITIONS	NURSE CROP	SEED MIXTURE (SELECT ONE MIXTURE)
SLOPES AND BANKS (NOT MOWED)		
WELL-DRAINED	1 PLUS	3, 5, 8, OR 12 (1)
VARIABLE DRAINAGE	1 PLUS	3 OR 7
SLOPES AND BANKS (MOWED)		
WELL-DRAINED	1 PLUS	2 OR 10
SLOPES AND BANKS (GRAZED/HAY)		
WELL-DRAINED	1 PLUS	2,3, OR 13
GULLIES AND ERODED AREAS	1 PLUS	3, 5, 7, OR 12 (1)
EROSION CONTROL FACILITIES (BMPS)		
SOD WATERWAYS, SPILLWAYS, FREQUENT WATER FLOW AREAS	1 PLUS	2, 3, OR 4
DRAINAGE DITCHES		
SHALLOW, LESS THAN THREE FEET DEEP	1 PLUS	2, 3, OR 4
DEEP, NOT MOWED	1 PLUS	5 OR 7
POND BANKS, DIKES, LEVEES, DAMS, DIVERSION CHANNELS, AND OCCASIONAL WATER FLOW AREAS		
MOWED AREAS	1 PLUS	2 OR 3
NON-MOWED AREAS	1 PLUS	5 OR 7
FOR HAY OR SILAGE ON DIVERSION CHANNELS AND OCCASIONAL WATER FLOW AREAS	1 PLUS	3 OR 13
HIGHWAYS (2)		
NON-MOWED AREAS		
WELL-DRAINED	1 PLUS	5, 7, 8, 9, OR 10
VARIABLE DRAINED	1 PLUS	3 OR 7
POORLY DRAINED	1 PLUS	3 OR 9
AREAS MOWED SEVERAL TIMES PER YEAR	1 PLUS	2, 3, OR 10
UTILITY ROW		
WELL-DRAINED	1 PLUS	5, 8, OR 12 (1)
VARIABLE DRAINED	1 PLUS	3 OR 7
WELL-DRAINED AREAS FOR GRAZING/HAY	1 PLUS	2, 3, OR 13
EFFLUENT DISPOSAL AREAS	1 PLUS	3 OR 4
SANITARY LANDFILLS	1 PLUS	3, 5, 7, 11 (1), OR 12 (1)
SURFACE MINES		
SPOILS, MINE WASTES, FLY ASH, SLAG, SETTLING BASIN RESIDUES AND OTHER SEVERELY DISTURBED AREAS (LIME TO SOIL TEST)	1 PLUS	3, 4, 5, 7, 8, 9,11 (1) OR 12(1)
SEVERELY DISTURBED AREAS FOR GRAZING/HAY	1 PLUS	3 OR 13
	NONE	WETLAND SEED MIX
WETLAND	1 PLUS	SEE WETLAND SEED MIX
RESIDENTIAL/LAWN	1 PLUS	PENN DOT FORMULA B

NOTES:

1. FOR SEED MIXTURES 11 AND 12, ONLY USE SPRING OATS OR WEEPING LOVEGRASS (INCLUDED IN MIX) AS NURSE CROP.
2. CONTACT THE PA DEPARTMENT OF TRANSPORTATION DISTRICT ROADSIDE SPECIALIST FOR SPECIFIC SUGGESTIONS ON TREATMENT TECHNIQUES AND MANAGEMENT PRACTICES.
3. SEED TYPICAL WETLAND RESTORATION DETAIL ON PLAN SHEET ES-0.15 FOR ADDITIONAL NOTES, DETAIL, AND SPECIAL AREA RESTORATIONS.
4. DO NOT LIME OR FERTILIZE IN WETLAND.

PEM WETLAND SEED MIX

ERNST CONSERVATION SEED MIX NO. ERNMX-122 FACW MEADOW MIX

SEEDING RATE	20 LB PER ACRE, OR 1/2 LB PER 1,000 SQ FT	SEEDING RATE	20 LB PER ACRE, OR 1/2 LB PER 1,000 SQ FT
%	SPECIES LIST	%	SPECIES LIST CONTINUED
31%	FOX SEDGE (CAREX VULPINOIDEA)	1%	SWAMP MILKWEED (ASCLEPIAS INCARNATA)
20%	VIRGINIA WILDRYE (ELYMUS VIRGINICUS)	1%	NEW ENGLAND ASTER (ASTER NOVAE-ANGLIAE (SYMPHYOTRICHUM N.))
14%	LURID (SHALLOW) SEDGE (CAREX LURIDA)	1%	FLAT TOPPED WHITE ASTER (ASTER UMBELLATUS (DOELLINGERIA UMBELLATE))
5%	GREEN BULRUSH (SCIPUS ATROVIRENS)	0.5%	JOE PYE WEED (EUPATORIUM FISTULOSUM)
4%	BLUE VERVAIN (VERBENA HASTATE)	0.5%	BONESET (EUPATORIUM PERFOLIATUM)
3.5%	WOOD REEDGRASS (CINNA ARUNDINACEA)	0.5%	DITCH STONECROP (PENTHORUM SEDOIDES)
3%	SOFT RUSH (JUNCUS EFFUSES)	0.5%	NARROWLEAF BLUE EYED GRASS (SISYRINCHLUM ANGUSTIFOLIUM)
3%	BLUNT BROOM SEDGE (CAREX SCOPARIA)	0.5%	SEEDBOX (LUDWIGIA ALTERNIFOLIA)
3%	HOP SEDGE (CAREX LUPUTINA)	0.5%	GREAT BLUE LOBELIA (LOBELIA SIPHILITICA)
2%	SENSITIVE FERN (ONOCLEA SENSIBILIS)	0.5%	MUD PLANTAIN (WATER PLANTAIN) (ALISMA SUBCORDATUM (A. PLANTAGO-AQUATICA))
2%	OXEYE SUNFLOWER (HELIOPSIS HELIANTHOIDES)	0.5%	SQUARE STEMMED MONKEYFLOWER (MIMULUS RINGENS)
1%	RATTLESNAKE GRASS (GLYCERIA CANADENSIS)	0.4%	BLADDER (STAR) SEDGE (CAREX INTUMESCENS)
1%	WOOLGRASS (SCIRPUS CYPERINUS)	0.1%	SLENDER MOUNTAINMINT (PYCNANTHEMUM TENUIFOLIUM)
		TOTAL: 100%	

PLANTING SPECIFICATIONS FOR PFO OR PSS WETLAND RESTORATION AREAS (SEE ES-0.08 FOR RESTORATION DETAIL)

VEGETATION PLANTING TYPE	SIZE	SPECIES[A]		WETLAND STATUS[B]
SHRUB SPECIES	TWO TO THREE-FOOT WHIP	ALNUS SERRULATA	SMOOTH ALDER	OBL
		CORNUS AMONUM	SILKY DOGWOOD	FACW
		LINDERA BENZOIN	SPICEBUSH	FAC
		VIBURNUM DENTATUM	NORTHERN ARROW-WOOD	FAC
TREE SPECIES	CONTAINERIZED (1-INCH DBH)[C]	ACER RUBRUM	RED MAPLE	FAC
		BETULA ALLEGHANIENSIS	YELLOW BIRCH	FAC
		PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	FACW
		QUERCUS BICOLOR	SWAMP WHITE OAK	FACW
		SALIX NIGRA	BLACK WILLOW	OBL

NOTES:

A – IF LISTED SPECIES IS UNAVAILABLE DURING PLANTING, A COMPARABLE NATIVE SUBSTITUTE WILL BE USED.
B – USACE EASTERN MOUNTAINS AND PIEDMONT WETLAND STATUS TREES AND SHRUBS WILL BE PLANTED AT A DENSITY OF AT LEAST 400 PLANTS MINIMUM PER USACE GUIDANCE.
C – DBH: DIAMETER AT BREAST HEIGHT

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REVISIONS

NO.	BY	DATE	REMARKS

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL & SITE RESTORATION PLAN NOTES & DETAILS

DATE: NOVEMBER 2016
PROJECT NO.: 112C05958
DESIGNED BY: JB
DRAWN BY: BH
CHECKED BY: RS

SHEET 3
SHEET 3 OF 22

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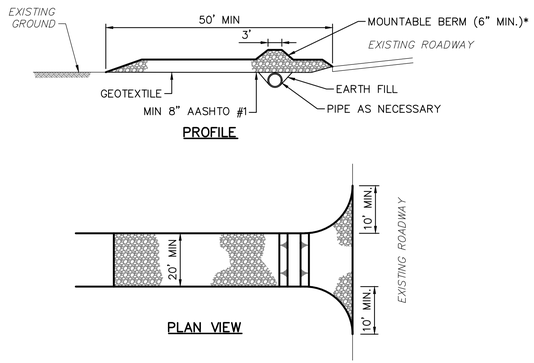


* MOUNTABLE BERM USED TO PROVIDE PROPER COVER FOR PIPE IF NEEDED.

NOTES:

REMOVE TOPSOIL PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.

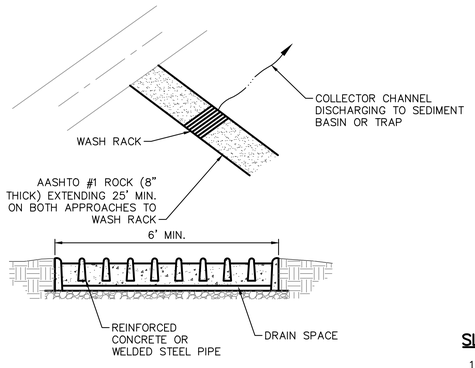
RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE SEDIMENT REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.

MOUNTABLE BERM SHALL BE INSTALLED WHEREVER OPTION CULVERT PIPE IS USED AND PROPER PIPE COVER AS SPECIFIED BY MANUFACTURER IS NOT OTHERWISE PROVIDED. PIPE SHALL BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.

MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THE PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

ROCK CONSTRUCTION ENTRANCE

NOT TO SCALE



NOTES:

WASH RACK SHALL BE 20 FEET (MIN.) WIDE OR TOTAL WIDTH OF ACCESS.

WASH RACK SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE ANTICIPATED CONSTRUCTION VEHICULAR TRAFFIC.

A WATER SUPPLY SHALL BE MADE AVAILABLE TO WASH THE WHEELS OF ALL VEHICLES EXITING THE SITE.

MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. DRAIN SPACE UNDER WASH RACK SHALL BE KEPT OPEN AT ALL TIMES. DAMAGE TO THE WASH RACK SHALL BE REPAIRED PRIOR TO FURTHER USE OF THE RACK. ALL SEDIMENT DEPOSITED ON ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

ROCK CONSTRUCTION ENTRANCE WITH WASH RACK

NOT TO SCALE

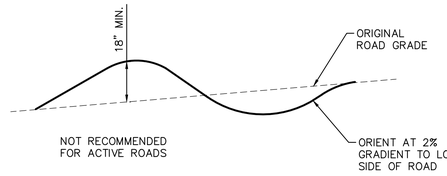
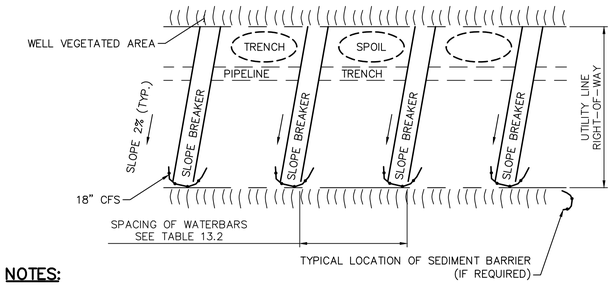


TABLE 13.2

MAXIMUM SPACING FOR PERMANENT WATERBARS ON A UTILITY LINE RIGHT–OF–WAY	
PERCENT SLOPE	SPACING (FT)
<5	250
5–15	150
15–30	100
>30	50



NOTES:

WATERBARS SHALL DISCHARGE TO A STABLE AREA.

WATERBARS SHALL BE INSPECTED WEEKLY (DAILY ON ACTIVE ROADS) AND AFTER EACH RUNOFF EVENT. DAMAGED OR ERODED WATERBARS SHALL BE RESTORED TO ORIGINAL DIMENSIONS WITHIN 24 HOURS OF INSPECTION.

MAINTENANCE OF WATERBARS SHALL BE PROVIDED UNTIL ROADWAY, SKIDTRAIL, OR RIGHT–OF–WAY HAS ACHIEVED PERMANENT STABILIZATION.

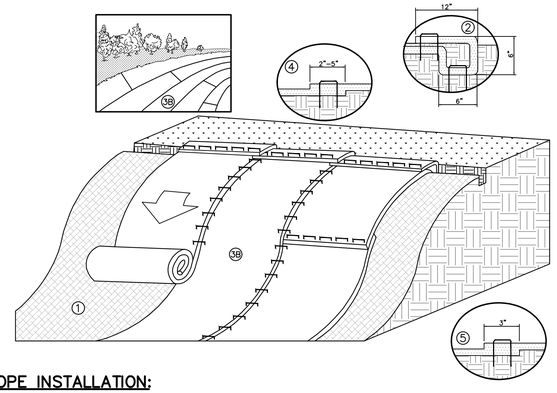
WATERBARS ON RETIRED ROADWAYS, SKIDTRAILS, AND RIGHT–OF–WAYS SHALL BE LEFT IN PLACE AFTER PERMANENT STABILIZATION HAS BEEN ACHIEVED.

SEE TABLE 13.2 ABOVE FOR WATERBAR SPACING.

PERMANENT WATERBARS ARE REQUIRED AT ALL STREAM, RIVER, AND OTHER WATER–BODY CROSSINGS AS WELL AS UPSLOPE FROM ROADWAY AND RAILROAD CUT SLOPES.

WATERBAR

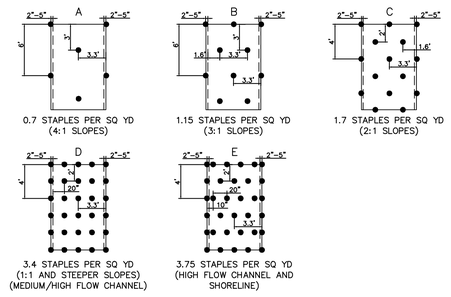
NOT TO SCALE



SLOPE INSTALLATION:

1. PREPARE SOIL BEFORE INSTALLING RECPs, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECPs IN A 6 IN. DEEP X 6 IN. WIDE TRENCH WITH APPROXIMATELY 12 IN. OF RECPs EXTENDED BEYOND THE UPSLOPE PORTION OF THE TRENCH. ANCHOR THE RECPs WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12 IN. APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO THE COMPACTED SOIL AND FOLD THE REMAINING 12 IN. PORTION OF RECPs BACK OVER THE SEED AND COMPACTED SOIL. SECURE RECPs OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12 IN. APART ACROSS THE WIDTH OF THE RECPs.
3. ROLL THE RECPs (3A) DOWN OR (3B) HORIZONTALLY ACROSS THE SLOPE. RECPs WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECPs MUST BE SECURELY FASTENED TO SOIL SURFACE BY REPLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE.
4. THE EDGES OF PARALLEL RECPs MUST BE STAPLED WITH AN APPROXIMATELY 2 IN. – 5 IN. OVERLAP DEPENDING ON THE RECP TYPE.
5. CONSECUTIVE RECP SPLICED DOWN THE SLOPE MUST BE END–OVER–END (SHINGLE STYLE) WITH AN APPROXIMATE 3 IN. OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12 IN. APART ACROSS ENTIRE RECPs WIDTH.

STAPLE PATTERN GUIDE



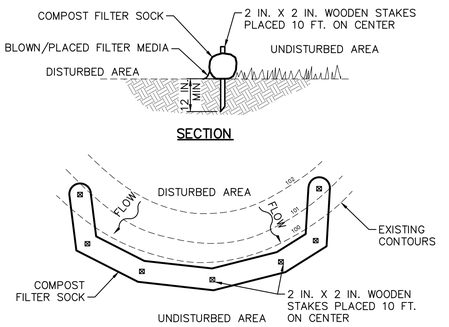
NOTES:

1. FOR SLOPES BETWEEN 3:1 AND 1:1, USE NORTH AMERICAN GREEN ERONET SC 150 OR OWNER APPROVED EQUAL MATERIAL/METHOD.
2. IN AREAS WHERE LIVESTOCK ARE KEPT, USE NORTH AMERICAN GREEN BIONET SC 150 BN OR OWNER APPROVED EQUAL MATERIAL/METHOD.
3. SEED AND SOIL AMENDMENTS SHALL BE APPLIED ACCORDING TO THE RATES IN THE PLAN DRAWINGS PRIOR TO INSTALLING THE BLANKET.
4. PROVIDE ANCHOR TRENCH AT TOE OF SLOPE IN SIMILAR FASHION AS AT TOP OF SLOPE
5. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS, AND GRASS.
6. BLANKET SHALL HAVE GOOD CONTINUOUS CONTACT WITH UNDERLYING SOIL THROUGHOUT ENTIRE PROJECT LENGTH. LAY BLANKET LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH SOIL. DO NOT STRETCH BLANKET.
7. THE BLANKET SHALL BE STAPLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS,
8. BLANKETED AREAS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT UNTIL PERENNIAL VEGETATION IS ESTABLISHED TO A MINIMUM UNIFORM 70% COVERAGE THROUGHOUT THE BLANKETED AREA. DAMAGED OR DISPLACED BLANKETS SHALL BE RESTORED OR REPLACED WITHIN 4 CALENDAR DAYS.

EROSION CONTROL BLANKET – SLOPE INSTALLATION

NOT TO SCALE

MAXIMUM SLOPE LENGTHS FOR COMPOST FILTER SOCK			
% SLOPE	12" DIAMETER	18" DIAMETER	24" DIAMETER
2 (OR LESS)	520	700	1000
5	250	340	500
10	150	250	300
15	100	200	250
20	70	140	200
25	50	100	140
30	45	70	100
35	40	60	90
40	35	45	60
45	30	40	50
50	20	30	40



NOTES:

SOCK FABRIC SHALL MEET STANDARDS OF TABLE 4.1 OF THE PA DEP EROSION CONTROL MANUAL. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2 OF THE EPA DEP EROSION CONTROL MANUAL.

COMPOST FILTER SOCK SHALL BE PLACED AT EXITING LEVEL GRADE. BOTH ENDS OF THE BARRIER SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY BARRIER SHALL NOT EXCEED THAT SPECIFIED FOR THE SIZE OF THE SOCK AND THE SLOPE OF ITS TRIBUTARY AREA.

TRAFFIC SHALL NOT BE PERMITTED TO CROSS COMPOST FILTER SOCKS.

ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES ½ THE ABOVE GROUND HEIGHT OF THE BARRIER AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.

COMPOST FILTER SOCK SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.

BIODEGRADABLE COMPOST FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

TABLE 4.1

COMPOST SOCK FABRIC MINIMUM SPECIFICATIONS					
MATERIAL TYPE	3 MIL HDPE	5 MIL HDPE	5 MIL HDPE	MULTI–FILAMENT POLYPROPYLENE (MFPP)	HEAVY DUTY MULTI–FILAMENT POLYPROPYLENE (HDMFPP)
MATERIAL CHARACTERISTICS	PHOTO–DEGRADABLE	PHOTO–DEGRADABLE	BIO–DEGRADABLE	PHOTO–DEGRADABLE	PHOTO–DEGRADABLE
SOCK DIAMETERS	12" 18"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"
MESH OPENING	3/8"	3/8"	3/8"	3/8"	1/8"
TENSILE STRENGTH		26 PSI	26 PSI	44 PSI	202 PSI
ULTAVIOLET STABILITY % ORIGINAL STRENGTH (ASTM G–155)	23% AT 1000 HR.	23% AT 1000 HR.		100% AT 1000 HR.	100% AT 1000 HR.
MINIMUM FUNCTIONAL LONGEVITY	6 MONTHS	9 MONTHS	6 MONTHS	1 YEAR	2 YEARS
TWO–PLY SYSTEMS					
INNER CONTAINMENT NETTING	HDPE BIAXIAL NET				
	CONTINUOUSLY WOUND				
	FUSION–WELDED JUNCTURES				
	3/4" X 3/4" MAX. APERTURE SIZE				
OUTER FILTRATION MESH	COMPOSITE POLYPROPYLENE FABRIC (WOVEN LAYER AND NON–WOVEN FLEECE MECHANICALLY FUSED VIA NEEDLE PUNCH)				
	3/16" MAX. APERTURE SIZE				
SOCK FABRICS COMPOSED OF BURLAP MAY BE USED ON PROJECTS LASTING 6 MONTHS OR LESS.					

TABLE 4.2

COMPOST STANDARDS	
ORGANIC MATTER CONTENT	25%–100% (DRY WEIGHT BASIS)
ORGANIC PORTION	FIBROUS AND ELONGATED
PH	5.5–8.5
MOISTURE CONTENT	30%–60%
PARTICLE SIZE	30%–50% PASS THROUGH 3/8" SIEVE
SOLUBLE SALT CONCENTRATION	5.0 DS/M (MMHOS/XM) MAXIMUM

COMPOST FILTER SOCK

NOT TO SCALE

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REVISIONS

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SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT

1–20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL & SITE RESTORATION PLAN NOTES & DETAILS

DATE:	NOVEMBER 2016
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

SHEET 4

SHEET 4 OF 22

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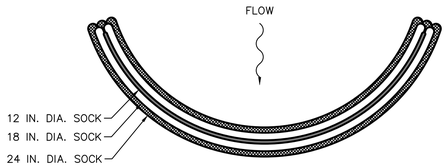
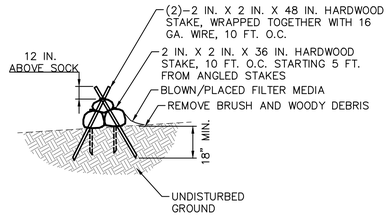


PLAN VIEW



STAKING VIEW

DESIGN NOTES:

1. COMPOST SEDIMENT TRAP SHALL BE SIZED TO PROVIDE 2000 CUBIC FEET OF STORAGE CAPACITY FOR EACH ACRE TRIBUTARY TO THE TRAP.
2. MINIMUM BASE WIDTH IS EQUAL TO THE HEIGHT.
3. SEDIMENT ACCUMULATION SHALL NOT EXCEED ⅓ THE TOTAL HEIGHT OF THE TRAP.
4. SOCKS SHALL BE OF LARGER DIAMETER AT THE BASE OF THE TRAP AND DECREASE IN DIAMETER FOR SUCCESSIVE LAYERS AS SHOWN ON THE PLAN VIEW.
5. ENDS OF THE TRAP SHALL BE A MINIMUM OF 1 FOOT HIGHER IN ELEVATION THAN THE MID–SECTION, WHICH SHALL BE LOCATED AT THE POINT OF DISCHARGE.

NOTES:

SOCK MATERIAL SHALL MEET THE STANDARDS OF TABLE 4.1 OF THE PA DEP EROSION CONTROL MANUAL. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2 OF THE PA DEP EROSION CONTROL MANUAL.

COMPOST SOCK SEDIMENT TRAPS SHALL NOT EXCEED THREE SOCKS IN HEIGHT AND SHALL BE STACKED IN PYRAMIDAL FORM AS SHOWN ABOVE. MINIMUM TRAP HEIGHT IS ONE 24" DIAMETER SOCK. ADDITIONAL STORAGE MAY BE PROVIDED BY MEANS OF AN EXCAVATED SUMP 12" DEEP EXTENDING 1 TO 3 FEET UPSLOPE OF THE SOCKS ALONG THE LOWER SIDE OF THE TRAP.

COMPOST SOCK SEDIMENT TRAPS SHALL PROVIDE 2,000 CUBIC FEET STORAGE CAPACITY WITH 12" FREEBOARD FOR EACH TRIBUTARY DRAINAGE ACRE. (SEE MANUFACTURER FOR ANTICIPATED SETTLEMENT.)

THE MAXIMUM TRIBUTARY DRAINAGE AREA IS 5.0 ACRES. SINCE COMPOST SOCKS ARE "FLOW–THROUGH," NO SPILLWAY IS REQUIRED.

COMPOST SOCK SEDIMENT TRAPS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. SEDIMENT SHALL BE REMOVED WHEN IT REACHES ⅓ THE HEIGHT OF THE SOCKS.

PHOTODEGRADABLE AND BIODEGRADABLE SOCKS SHALL NOT BE USED FOR MORE THAN 1 EYAR.

COMPOST SOCK SEDIMENT TRAP

NOT TO SCALE

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SHEET 5

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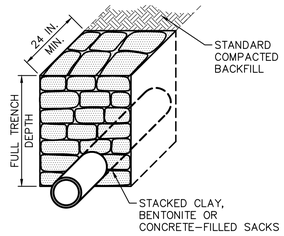
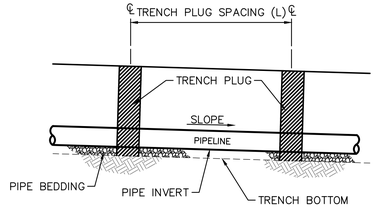


SECTION VIEW



ELEVATION

REQUIRED SPACING & MATERIALS FOR TRENCH PLUGS		
TRENCH SLOPE (%)	SPACING L (FT)	PLUG MATERIAL
<5	1,000	* CLAY, BENTONITE OR CONCRETE-FILLED SACKS
5-15	500	* CLAY, BENTONITE OR CONCRETE-FILLED SACKS
15-25	300	* CLAY, BENTONITE OR CONCRETE-FILLED SACKS
25-35	200	* CLAY, BENTONITE OR CONCRETE-FILLED SACKS
35-100	100	* CLAY, BENTONITE OR CONCRETE-FILLED SACKS
>100	50	CEMENT BAGS (WETTED) OR MORTARED STONE

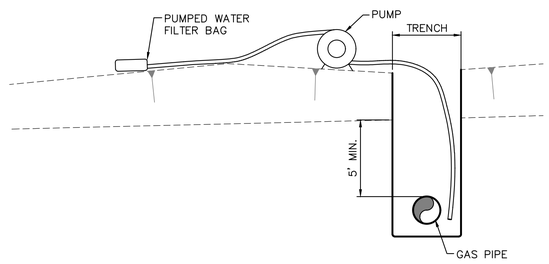
* TOP SOIL MAY NOT BE USED TO FILL SACKS

NOTES:

IMPERVIOUS TRENCH PLUGS ARE REQUIRED FOR ALL STREAM, RIVER, WETLAND, OR OTHER WATERBODY CROSSINGS.

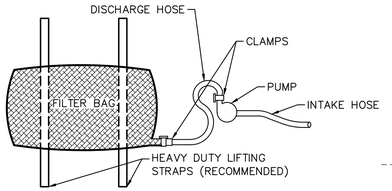
TRENCH PLUG INSTALLATION

NOT TO SCALE

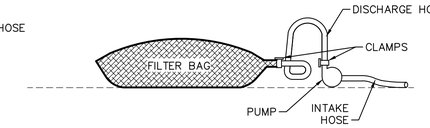


TRENCH DEWATERING DETAIL

NOT TO SCALE



PLAN VIEW



ELEVATION VIEW

NOTES:

LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-3751	80 SIEVE

A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES SHALL BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME ½ FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS SHALL BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.

BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NO POSSIBLE, A GEOTEXTILE UNDERLAYMENT AND FLOW PATH SHALL BE PROVIDED. BAGS MAY BE PLACE DON FILTER STONE TO INCREASE DISCHARGE CAPACITY. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5% FOR SLOPES EXCEEDING 5%, CLEAN ROCK OR OTHER NON-ERODIBLE AND NON-POLLUTING MATERIAL MAY BE PLACE UNDER THE GAB TO REDUCE SLOPE STEEPNESS.

NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. COMPOST BERM OR COMPOST FILTER SOCK SHALL BE INSTALLED BELOW BAGS LOCATED IN HQ OR EV WATERSHEDS, WITHIN 50 FEET OF ANY RECEIVING SURFACE WATER OR WHERE GRASSY AREA IS NOT AVAILABLE.

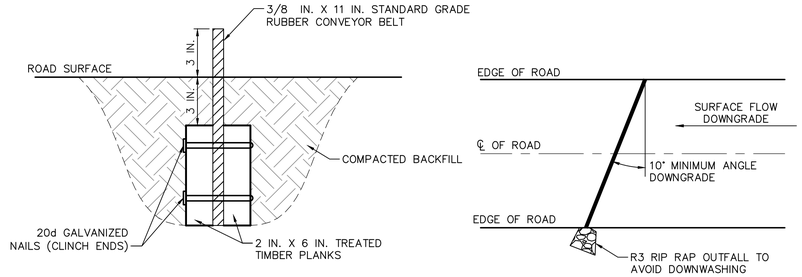
THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.

THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR ½ THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.

FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

PUMPED WATER FILTER BAG

NOT TO SCALE

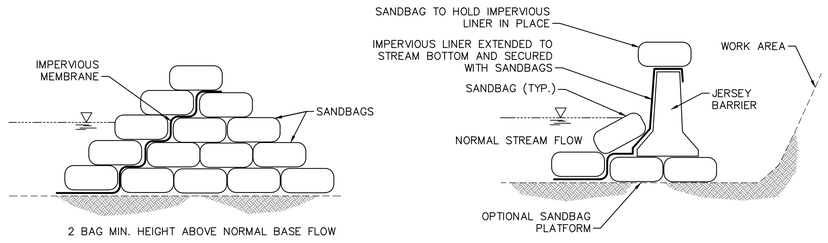


NOTE:
1. DEFLECTOR SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT.
2. ACCUMULATED SEDIMENT SHALL BE REMOVED FROM DEFLECTOR WITHIN 24 HOURS OF INSPECTION.
3. BELT SHALL BE REPLACED WHEN WORN AND NO LONGER EFFECTIVE.
4. MAXIMUM SPACING OF DEFLECTORS SHALL BE AS SHOWN IN TABLE.

ROAD GRADE (PERCENT)	SPACING BETWEEN DIPS, CULVERTS,OR DEFLECTORS (FEET)
<2	300
3	235
4	200
5	180
6	165
7	155
8	150
9	145
10	140

WATER DEFLECTOR

NOT TO SCALE



STACKED SANDBAGS OPTION

JERSEY BARRIER OPTION

NOTES:

CONSTRUCT DAMS WITH SAND BAGS, JERSEY BARRIERS OR SIMILAR MATERIAL WITH AN IMPERVIOUS LINER EXTENDED TO THE STREAM BOTTOM AND SECURED WITH SANDBAGS MAINTAINING AMBIENT DOWNSTREAM FLOW RATES.

SANDBAG OR DIVERSION DAM

NOT TO SCALE

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SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL & SITE RESTORATION PLAN NOTES & DETAILS

DATE:	NOVEMBER 2016
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DRAWN BY:	BH
CHECKED BY:	RS

SHEET 6

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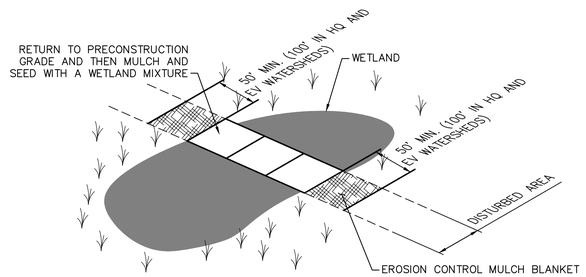
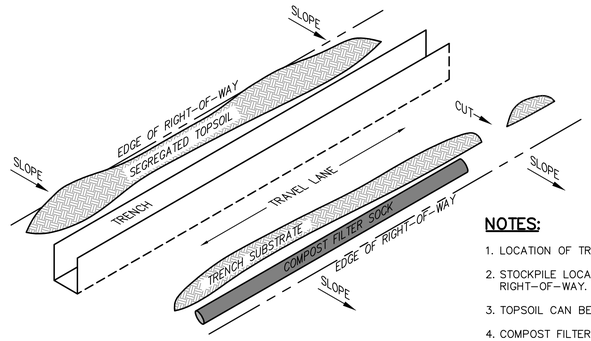


NOTES:

1. BACKFILL TRENCH; WERE SOILS WHERE SEGREGATED, REPLACE IN ORDER OF REMOVAL (CONSULT SPREAD HYDROGEOLOGIST PRIOR TO AND DURING BACKFILLING)
2. ONCE BACKFILLING IS COMPLETE, REMOVE TEMPORARY TIMBER MATTING AND ALL CONSTRUCTION DEBRIS AND RESTORE ORIGINAL GRADES AND HYDROLOGY.
3. RESTORATION ACTIVITIES SHALL BEGIN IMMEDIATELY AFTER BACKFILLING. TEMPORARILY REVEGETATE ALL IMPACTED WETLANDS IN ACCORDANCE WITH PLAN SHEET ES-0.04 TO ALLOW RAPID STABILIZATION AND DETER INVASIVE SPECIES.
4. PERMANENTLY REVEGETATE IMPACTED PEM WETLANDS IN ACCORDANCE WITH PLAN SHEET ES-0.04 THAT CALLS FOR ERNST CONSERVATION SEED MIX NO. ERNMX-122 FACW MEADOW MIX. PLANT DURING THE RECOMMENDED PLANTING SEASON.
5. TEMPORARY OR PERMANENT REVEGETATION IS NOT NECESSARY IN AREAS OF STANDING WATER.
6. NO SOIL AMENDMENTS, LIME, FERTILIZER, OR BINDING AGENTS ARE TO BE USED IN WETLAND AREAS.
7. PSS IMPACTED WETLAND AREAS WHERE NOTED ON PLAN SHEETS WILL BE PLANTED WITH SHRUB SPECIES IN ACCORDANCE WITH ES-0.04. PLANT DURING THE RECOMMENDED PLANTING SEASON.
8. PSS IMPACTED WETLAND AREAS WHERE THE ROOT SYSTEM WAS NOT REMOVED (E.G., MATTED OVER) DO NOT REQUIRE REPLANTING. PLANT DURING THE RECOMMENDED PLANTING SEASON.
9. PFO IMPACTED WETLANDS AREAS WHERE NOTED ON PLAN SHEETS FOR RESTORATION WILL BE PLANTED WITH THE TREE SPECIES IN ACCORDANCE WITH ES-0.04.
10. PSS AND PFO RESTORATION AREAS WILL BE PROTECTED WITH "NO-MOW" SIGNS.
11. REFER TO THE PROJECT'S IMPACT AVOIDANCE, MINIMIZATION, AND MITIGATION PROCEDURES FOR MORE SPECIFICS ON WETLAND RESTORATION IN GENERAL AND SPECIFICS REGARDING PSS AND PFO RESTORATION EFFORTS.

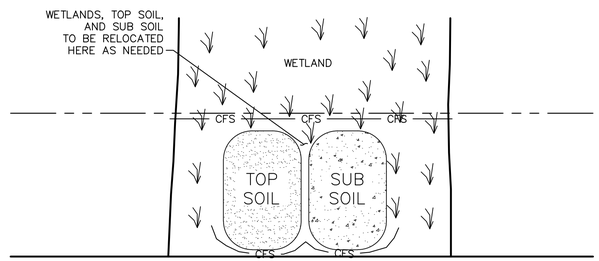
TYPICAL WETLAND RESTORATION
SCALE: NOT TO SCALE



NOTES:

1. LOCATION OF TRENCH AND TRAVEL LANE WILL VARY BASED ON PROPOSED PIPE LOCATIONS.
2. STOCKPILE LOCATION PLACED UPSLOPE OF TRENCH TO DIVERT OFF-SITE DRAINAGE AWAY FROM RIGHT-OF-WAY.
3. TOPSOIL CAN BE PLACED WITH DITCH SPOIL IF PROPERLY SEGREGATED.
4. COMPOST FILTER SOCK TO BE INSTALLED PARALLEL TO EXISTING CONTOURS.
5. TOPSOIL TO BE REPLACED TO PRECONSTRUCTION DEPTH (TO BE FIELD VERIFIED).

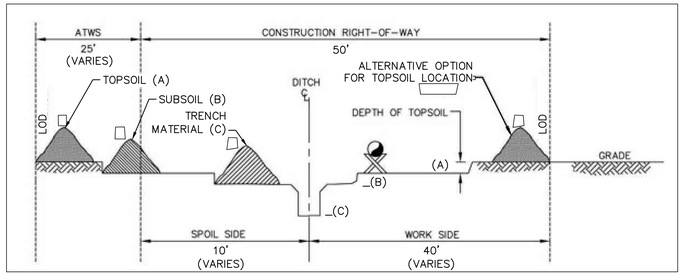
RIGHT-OF-WAY DETAIL
NOT TO SCALE

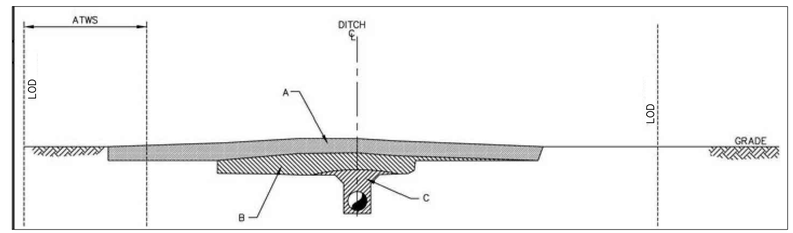


NOTES:

1. PROVIDE PHYSICAL SEPARATION BENEATH SPOIL PILES AND WETLAND SOIL TO ENSURE FULL REMOVAL AND TO MINIMIZE IMPACTS.

SPOIL STOCKPILE CONTAINMENT – WETLANDS
NOT TO SCALE

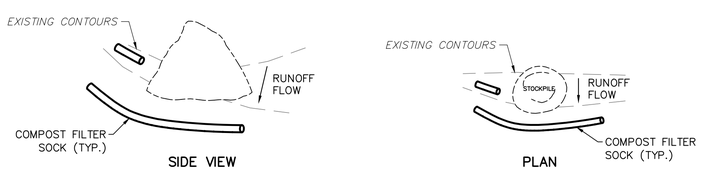




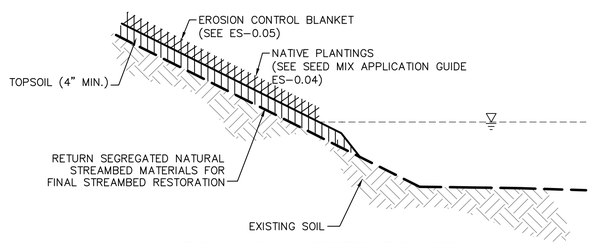
SPOIL STOCKPILE CONTAINMENT – TRIPLE DITCH
NOT TO SCALE

NOTES:

1. TRIPLE DITCH METHOD WILL BE USED TO SEGREGATE PROBLEM SOILS SUCH AS SALINE OR SODIC SOILS, IDENTIFIED STREAM CROSSINGS, AND/OR AS OTHERWISE DIRECTED.
2. ENSURE THE EXCAVATED SOILS ARE IN SEPARATE STOCKPILES WITH VISUAL SEPARATION OF AT LEAST 2' BETWEEN PILES.
3. EXCAVATED SOILS ARE TO BE PLACED BACK IN THE SEQUENCE IN WHICH WERE REMOVED.



SPOIL STOCKPILE CONTAINMENT – UPLANDS
NOT TO SCALE



TYPICAL BANK RESTORATION DETAIL
NOT TO SCALE

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SHEET 7 OF 22

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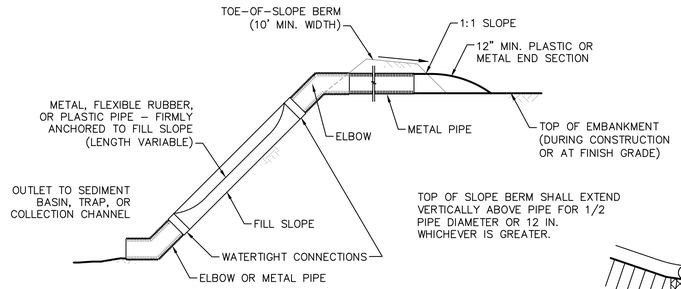
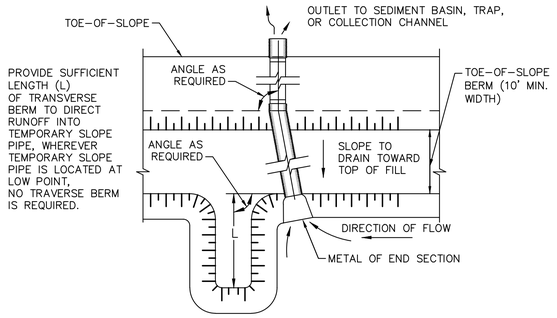




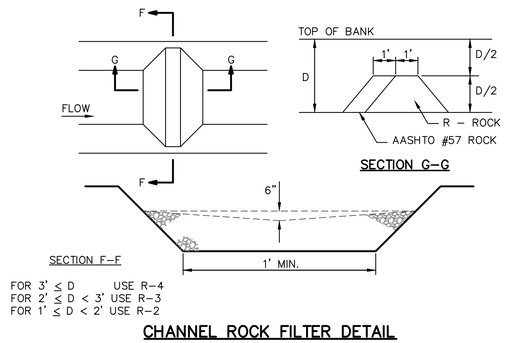
MINIMUM DIMENSIONS FOR TEMPORARY SLOPE PIPES		
DRAINAGE AREA (ACRES)	MINIMUM PIPE DIAMETER (IN.)	MINIMUM BERM HEIGHT (IN.)
<2	12	24
2–4	15	27
4–5	18	30

* TEMPORARY SLOPE PIPES SHOULD BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. ANY ACCUMULATED SEDIMENT SHOULD BE REMOVED FROM THE ENTRANCE. DAMAGED PIPE SHOULD BE REPAIRED OR REPLACED. NEEDED REPAIRS SHOULD BE INITIATED IMMEDIATELY AFTER THE INSPECTION.

NOTES:

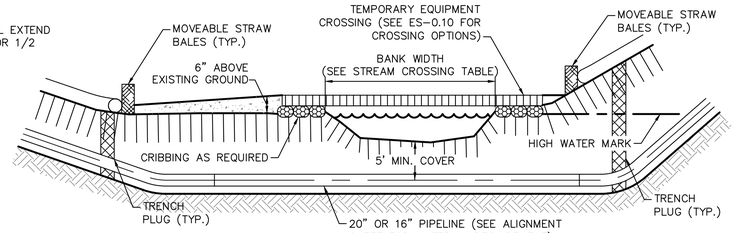
1. THE MAXIMUM DISTANCE BETWEEN ANCHOR STAKES SHALL BE 10 FEET.
2. TRANSVERSE BERM SHALL BE USED WHENEVER TEMPORARY SLOPE PIPE IS NOT LOCATED AT LOW POINT.
3. SLOPE PIPES SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. ANY ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE INLET IMMEDIATELY.
4. DAMAGED PIPE SECTIONS SHALL BE REPLACED WITHIN 24 HOURS. LEAKING CONNECTIONS SHALL BE REPAIRED IMMEDIATELY.

TEMPORARY SLOPE PIPE DETAIL
NOT TO SCALE

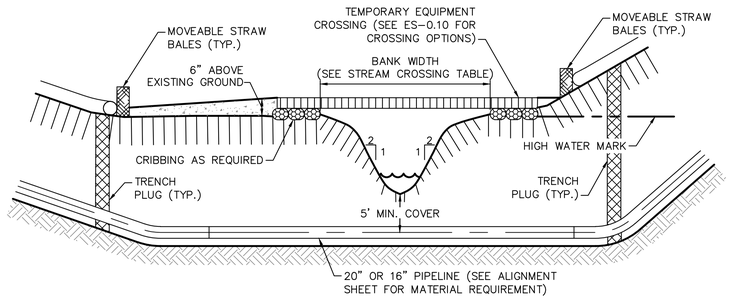


FOR 3' ≤ D USE R-4
FOR 2' ≤ D < 3' USE R-3
FOR 1' ≤ D < 2' USE R-2

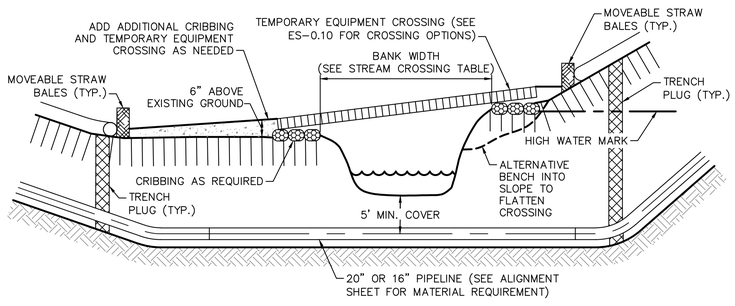
CHANNEL ROCK FILTER DETAIL
NOT TO SCALE



TYPICAL FLAT STREAM CROSSING



TYPICAL STEEP BANK STREAM CROSSING

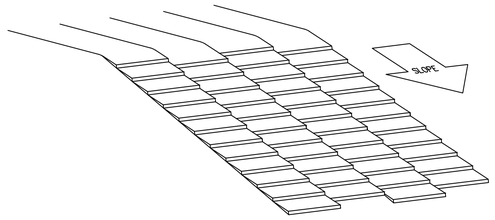


TYPICAL SLOPED STREAM CROSSING

NOTES:

1. SEE SITE SPECIFIC PLAN DRAWINGS FOR SITE SPECIFIC STREAM CROSSING DETAILS WHERE INDICATED.
2. STREAM CROSSING TECHNIQUE TO BE DETERMINED IN THE FIELD BY THE ENVIRONMENTAL INSPECTOR IN CONSULTATION WITH THE CONTRACTOR BASED UPON FIELD CONDITIONS.
3. SEE STREAM CROSSING TABLE FOR BANK WIDTHS.
4. SEE STEEP BANK STABILIZATION DETAIL WHEN BANK SLOPES ARE GREATER THAN 2H:1V.
5. SEE RIP-RAP BANK STABILIZATION DETAIL WHEN BANK SLOPE IS 2H:1V OR FLATTER.
6. SEE PLAN DRAWING FOR TRENCH PLUG LOCATIONS.

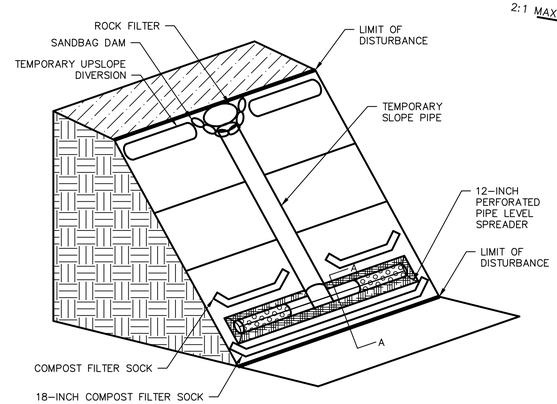
TYPICAL STREAM CROSSING DETAILS
NOT TO SCALE

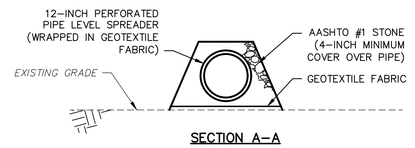


NOTES:

1. DOZER TREADS CREATE GROOVES PERPENDICULAR TO SLOPE.

SURFACE ROUGHENING DETAIL
NOT TO SCALE



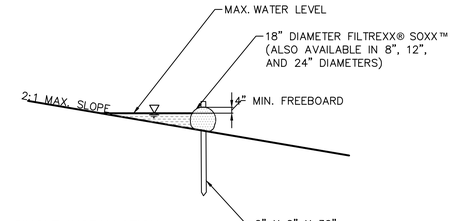


SECTION A–A

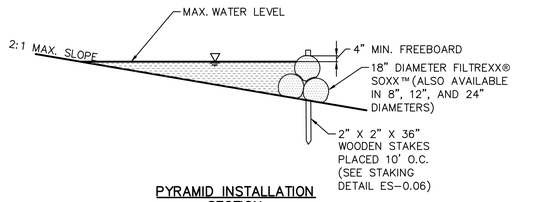
NOTES:

1. LEVEL SPREADER PIPES TO BE 12-INCH JM EAGLE EAGLE CORR PE PERFORATED PIPE (OR APPROVED EQUAL) AND SHALL BE CAPPED AT BOTH ENDS.
2. LEVEL SPREADER TO BE INSTALLED PARALLEL TO CONTOURS AT LEVEL ELEVATION.
3. PERFORATED PIPE TO BE UNDERLAIN AND WRAPPED WITH GEOTEXTILE FABRIC AND COVERED WITH AASHTO NO. 1 STONE. MINIMUM STONE COVER SHALL BE 4-INCHES OVER PERFORATED PIPE.
4. ALL LEVEL SPREADER STONE WILL BE REMOVED AND DISBTURBED AREA TO BE RESTORED IN ACCORDANCE WITH E&S PLAN.
5. LEVEL SPREADERS TO BE INSTALLED AT ALL TEMPORARY SLOPE PIPE DISCHARGES AT LOW POINTS OF DIVERSION BERM.
6. LEVEL SPREADERS TO BE INSPECTED WEEKLY OR AFTER MEASURABLE RAINFALL EVENT AND SHALL BE MAINTAINED IN GOOD CONDITION AT ALL TIMES.

TEMPORARY LEVEL SPREADER DETAIL
NOT TO SCALE

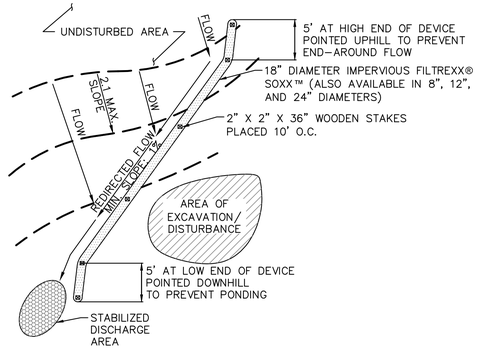


SINGLE INSTALLATION SECTION



PYRAMID INSTALLATION SECTION

FILTREXX® RUNOFF DIVERSION SECTIONS
NO SCALE



NOTES:

1. REMOVE SEDIMENT FROM THE UPSLOPE SIDE OF THE SOXX™ WHEN ACCUMULATION HAS REACHED ½ OF EFFECTIVE HEIGHT OF SOXX™.
2. SLOPES GREATER THAN 5% MAY REQUIRE ADDITIONAL STABILIZATION PRACTICES.
3. SOXX™ MAY BE SEEDED AT THE TIME OF INSTALLATION.
4. ALTERNATE COMPOST FILTER SOCK MAY BE SUBSTITUTED FOR FILTREXX® SOXX™ WITH PRIOR APPROVAL FROM THE ENGINEER.

TEMPORARY UPSLOPE DIVERSION BERM FOR FILTREXX® RUNOFF DIVERSION
NOT TO SCALE

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REVISIONS

NO.	BY	DATE	REMARKS

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

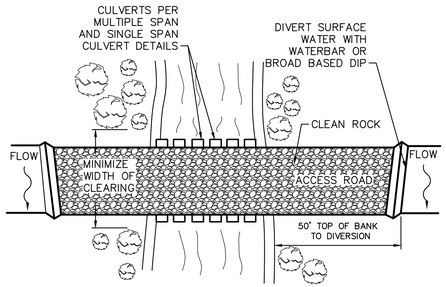
PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL & SITE RESTORATION PLAN
NOTES & DETAILS

DATE:	NOVEMBER 2016
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

SHEET 8
SHEET 8 OF 22



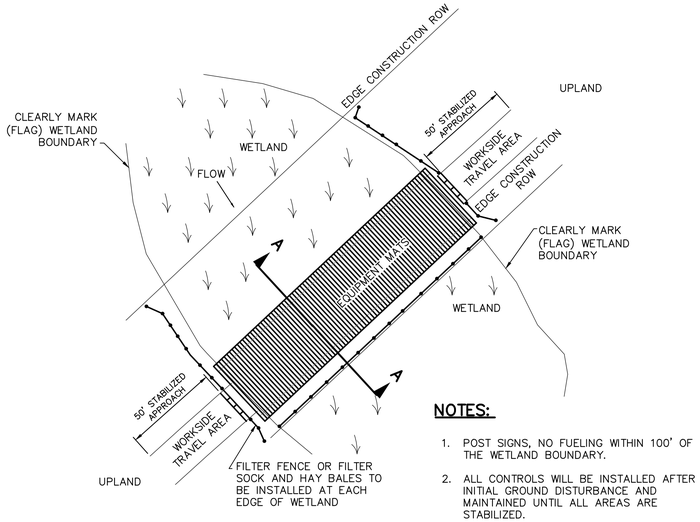
PLAN VIEW

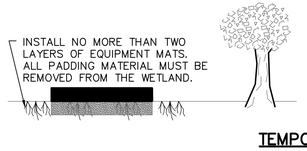
NOTES:

1. WATERBARS AND BROAD-BASED DIPS SHALL DISCHARGE TO 18" CFS OR APPROVED SEDIMENT REMOVAL FACILITY.
2. CLEAN ROCK SHALL CONFORM TO CHAPTER 105 PERMITTING REQUIREMENTS.
3. FOLLOW PERMIT CONDITIONS REGARDING REMOVAL OF CROSSING.
4. ALTERNATIVELY, TIMBER MATS MAY BE USED TO FORM THE TRAVEL SURFACE.
5. PROVIDE 50' STABILIZED ACCESS TO CROSSING ON BOTH SIDES OF STREAM CHANNEL (SEE PLAN VIEW). THE STABILIZED APPROACH MAY CONSIST OF GRAVEL (AASHTO #1 OR EQUAL) OR TIMBER MATS.
6. PIPES SHALL EXTEND BEYOND THE TOE OF THE CROSSING SUPPORT.
7. RUNOFF FROM THE ROADWAY SHALL BE DIVERTED OFF THE ROADWAY AND INTO A SEDIMENT REMOVAL BMP BEFORE IT REACHES THE ROCK APPROACH TO THE CROSSING.
8. FOLLOW TROUT STREAM RESTRICTIONS SHOWN ON PLAN SHEETS.

TEMPORARY CULVERT STREAM CROSSING

NOT TO SCALE



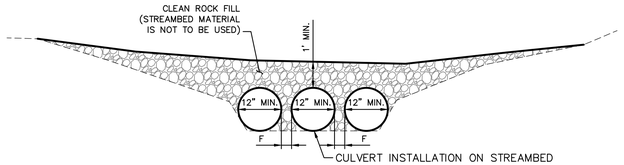


NOTES:

1. POST SIGNS, NO FUELING WITHIN 100' OF THE WETLAND BOUNDARY.
2. ALL CONTROLS WILL BE INSTALLED AFTER INITIAL GROUND DISTURBANCE AND MAINTAINED UNTIL ALL AREAS ARE STABILIZED.
3. LIMIT STUMP REMOVAL TO TRENCH LINE, UNLESS OTHER STUMPS CAUSE AN UNSAFE CONDITION.
4. RESTORE TO ORIGINAL CONTOUR AND DRAINAGE; RESTORE WETLAND MATERIAL.
5. RESTORE WETLAND IN ACCORDANCE WITH SHEET PLAN ES-0.08.

TEMPORARY TIMBER MAT WETLAND CROSSING

NOT TO SCALE

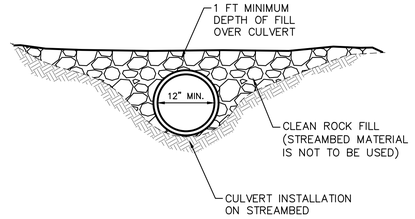


NOTE:

1. MULTIPLE PIPES AND MULTIPLE SPAN BRIDGES AND CULVERTS WHICH MAY TEND TO COLLECT DEBRIS, CONTRIBUTE TO THE FORMATION OF ICE JAMS AND INCREASE HEAD LOSSES SHALL BE AVOIDED TO THE MAXIMUM EXTENT PRACTICABLE. CROSSINGS OF LESS THAN 15 FEET SHALL BE BY ONE SPAN, EXCEPT WHERE CONDITIONS MAKE IT IMPRACTICAL TO AFFECT THE CROSSING WITHOUT MULTIPLE SPANS (SECTION 105.162).
2. REFER TO PADEP E&S MANUAL PAGES 39 AND 40 FOR DETAILS #3-13 (SINGLE SPAN CULVERT) AND #3-14 (MULTIPLE SPAN OUTLET) FOR ADDITIONAL INFORMATION.

MULTIPLE SPAN CULVERT

NOT TO SCALE



CROSS-SECTION VIEW

SINGLE SPAN CULVERT

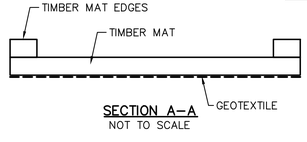
NOT TO SCALE

MAINTENANCE OF TEMPORARY EQUIPMENT CROSSING:

1. TEMPORARY STREAM CROSSING SHALL BE INSPECTED ON A DAILY BASIS.
2. DAMAGED CROSSINGS SHALL BE REPAIRED WITHIN 24 HOURS OF THE INSPECTION AND BEFORE ANY SUBSEQUENT USE.
3. SEDIMENT DEPOSITS ON THE CROSSING OR ITS APPROACHES SHALL BE REMOVED REGULARLY AND PLACED IN SOIL STOCKPILES.
4. FLOW THROUGH SHALL BE INSPECTED DAILY AND IMPEDANCES REMOVED WITHIN 24 HOURS.
5. AS SOON AS TEMPORARY CROSSING IS NO LONGER NEEDED, IT SHALL BE REMOVED. ALL MATERIALS SHALL BE DISPOSED OF PROPERLY AND AREAS STABILIZED. TEMPORARY EQUIPMENT CROSSINGS SHALL BE IN PLACE FOR NO LONGER THAN 1 YEAR.

TEMPORARY EQUIPMENT CROSSING DETAILS

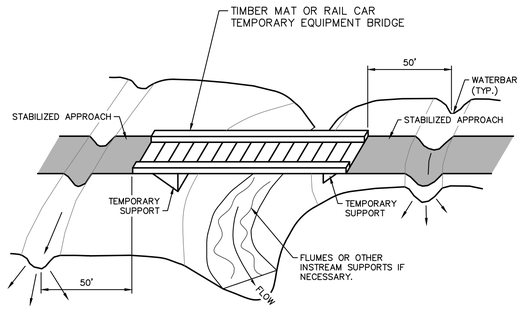
NOT TO SCALE

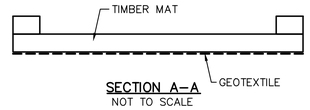


SECTION A-A
NOT TO SCALE

NOTE:

1. IF TIMBER MAT OR EQUIPMENT BRIDGE EDGES ARE NOT PROVIDED ON MAT TO CONTAIN SEDIMENT, INSTALL CFS IN SPECIAL PROTECTION WATERSHEDS OR SILT FENCE IN NON-SPECIAL PROTECTION WATERSHEDS TO PREVENT ANY SEDIMENT FROM THE EQUIPMENT CROSSING FROM ENTERING THE WETLAND.
2. GEOTEXTILE SHALL BE WOVEN WITH A MINIMUM GRAB TENSILE STRENGTH OF 200 POUNDS (MARV). ALTERNATES MUST BE APPROVED BY ENGINEER. WHERE SAFETY IS A CONCERN, GEOTEXTILE MAY BE REMOVED WITH PRIOR APPROVAL OF ENGINEER.
3. COMPOSITE MAT CAN BE SUBSTITUTED FOR TIMBER MATS.
4. ACCUMULATED SEDIMENT ON TIMBER MAT OR EQUIPMENT BRIDGE WILL BE REMOVED BY HAND AND PLACED IN SOIL STOCKPILES.





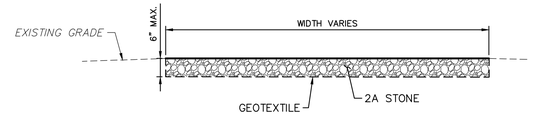
SECTION A-A
NOT TO SCALE

NOTES:

1. POST SIGNS; NO REFUELING WITHIN 100 FEET OF A STREAM.
2. APPROACHES TO CROSSINGS ARE NOT TO EXCEED 6" ABOVE ORIGINAL GRADE.
3. TIMBER MAT SPANS WITHOUT CENTER SUPPORT ARE LIMITED TO 15 FEET.
4. RAIL CAR SPANS WITHOUT CENTER SUPPORT ARE LIMITED TO 40 FEET.
5. GEOTEXTILE SHALL BE WOVEN WITH A MINIMUM GRAB TENSILE STRENGTH OF 200 POUNDS (MARV). ALTERNATES MUST BE APPROVED BY ENGINEER. WHERE SAFETY IS A CONCERN, GEOTEXTILE MAY BE REMOVED WITH PRIOR APPROVAL OF ENGINEER.
6. COMPOSITE MAT CAN BE SUBSTITUTED FOR TIMBER MATS.
7. CONSTRUCT AND MAINTAIN EQUIPMENT BRIDGES TO ALLOW UNRESTRICTED FLOW AND TO PREVENT SOIL FROM ENTERING THE WATERBODY.
8. WATERBARS AND BROAD-BASED DIPS SHALL DISCHARGE TO 18" CFS OR APPROVED SEDIMENT REMOVAL FACILITY.
9. FOLLOW PERMIT CONDITIONS REGARDING REMOVAL OF CROSSING.
10. PROVIDE 50' STABILIZED ACCESS TO CROSSING ON BOTH SIDES OF STREAM CHANNEL (SEE PLAN VIEW). THE STABILIZED APPROACH MAY CONSIST OF GRAVEL (AASHTO #1 OR EQUAL) OR TIMBER MATS.
11. RUNOFF FROM THE ROADWAY SHALL BE DIVERTED OFF THE ROADWAY AND INTO A SEDIMENT REMOVAL BMP BEFORE IT REACHES THE ROCK APPROACH TO THE CROSSING.
12. FOLLOW TROUT STREAM RESTRICTIONS SHOWN ON PLAN SHEETS.
13. ACCUMULATED SEDIMENT ON TIMBER MAT OR EQUIPMENT BRIDGE WILL BE REMOVED BY HAND AND PLACED IN SOIL STOCKPILES.

TEMPORARY EQUIPMENT BRIDGE STREAM CROSSING DETAIL

NOT TO SCALE



TYPICAL AGGREGATE ACCESS ROAD DETAIL

NOT TO SCALE

NOTES:

1. ENSURE RUNOFF FROM THE TRAVEL LANE SHALL BE DIVERTED OFF THE TRAVEL LANE INTO A SEDIMENT REMOVAL BMP BEFORE IT REACHES THE STABILIZED APPROACH.
2. GEOTEXTILE SHALL BE WOVEN WITH A MINIMUM GRAB TENSILE STRENGTH OF 200 POUNDS (MARV). ALTERNATES MUST BE APPROVED BY ENGINEER. WHERE SAFETY IS A CONCERN, GEOTEXTILE MAY BE REMOVED WITH PRIOR APPROVAL OF ENGINEER.

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NO.	BY	DATE	REMARKS

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PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL &
SITE RESTORATION PLAN
NOTES & DETAILS

DATE:	NOVEMBER 2016
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

SHEET 9
SHEET 9 OF 22

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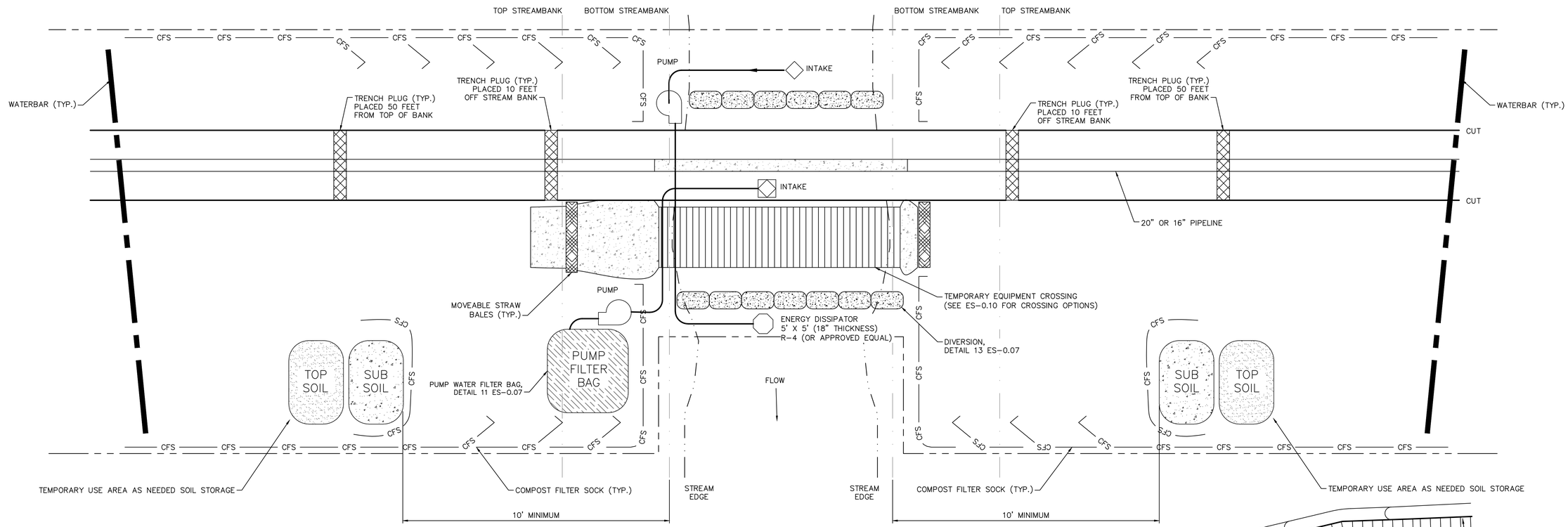
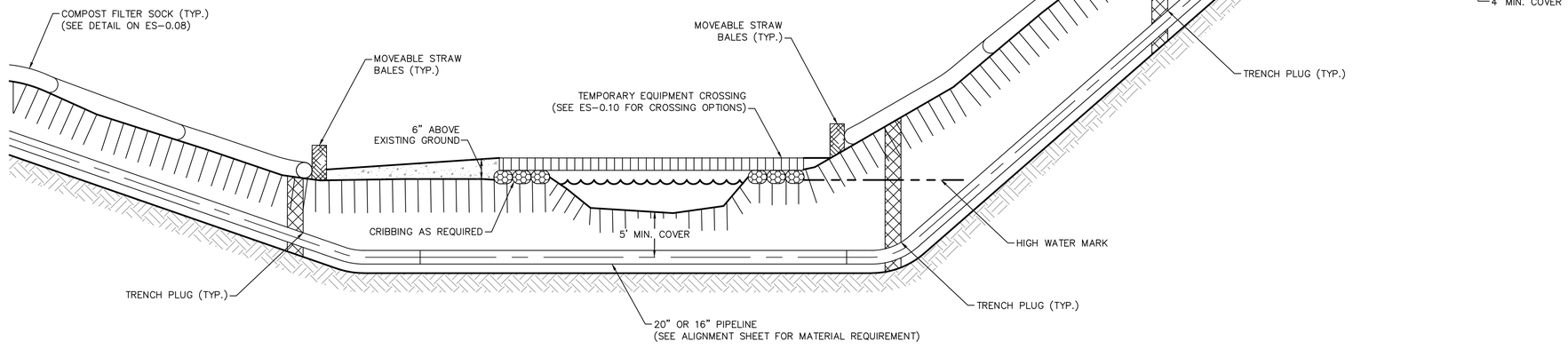


NOTES:

1. SEE PLAN SHEETS FOR FLOODWAY AND FLOODPLAIN LOCATIONS AND FOR REFERENCE TO SITE-SPECIRIC STREAM CROSSING DRAWINGS.
2. CONSTRUCT WATERBODY CROSSINGS AS PERPENDICULAR TO THE AXIS OF THE WATERBODY CHANNEL AS ENGINEERING AND ROUTING CONDITIONS ALLOW.
3. SETUP PUMP AND HOSE AS SHOWN, OR USE OTHER PRACTICAL ALTERNATIVES. PUMP SHOULD HAVE TWICE THE PUMPING CAPACITY OF ANTICIPATED FLOW.
4. CONTRACTOR TO ENSURE A SUFFICIENT NUMBER OF ACTIVE AND BACKUP PUMPS TO MAINTAIN TWCE THE PUMPING CAPACITY OF ANTICIPATED FLOW ARE AVAILABLE AT THE SITE DURING THE INSTALLATION.
5. INSTALL UPSTREAM DAM, THEN DOWNSTREAM STREAM DAM. KEEP PUMP RUNNING TO MAINTAIN STREAM FLOW, DETAIL 13 ES-0.07.
6. BYPASS PUMP INTAKES SHALL BE SCREENED AND MAINTAINED A SUFFICIENT DISTANCE FROM THE STREAM BOTTOM TO PREVENT PUMPING OF CHANNEL BOTTOM MATERIALS AND AQUATIC LIFE.
7. AN ENERGY DISSIPATOR IS REQUIRED AT THE DISCHARGE OF THE BYPASS PUMPS.
8. WATERBARS ARE TO BE PLACED 50 FEET FROM TOP OF BANK EXCEPT AS NOTED ON SITE SPECIFIC PLAN DRAWINGS.
9. MARK THE TOP OF STREAMBANK WITH HIGH VISIBLE FLAGGING AND POST RESOURCE AND NO REFUELING SIGNS WITHIN 100 FEET OF TOP OF STREAMBANK;
10. HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM TOP OF STREAMBANK;
11. GRUBBING SHALL NOT TAKE PLACE WITHIN 50 FEET OF TOP OF BANK PRIOR TO STREAM INSTALLATION WITH THE EXCEPTION OF THE TRAVEL LANE UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE AND PIPE IS READY FOR INSTALLATION;
12. CONSTRUCT DAMS WITH SAND BAGS, JERSEY BARRIERS OR SIMILAR MATERIAL WITH AN IMPERVIOUS LINER EXTENDED TO THE STREAM BOTTOM AND SECURED WITH SANDBAGS (SEE ES-0.07) MAINTAINING AMBIENT DOWNSTREAM FLOW RATES;
13. NATURAL STREAM BED MATERIAL TO BE STRIPPED AND SEGREGATED FROM SUBSURFACE MATERIAL FOR FINAL STREAMBED RESTORATION. EXCAVATION PORTION OF NATIVE STREAM BEDS COMPRISED OF ROCK, COBBLE, OR GRAVEL ARE TO BE STRIPPED AND SEGREGATED AND USED DURING STREAM RESTORATION.
14. REMOVE ALL CONSTRUCTION MATERIAL AND STRUCTURES FROM THE WATERBODY AFTER CONSTRUCTION;
15. RESTORE STREAM CHANNELS AND BOTTOMS TO THEIR PRECONSTRUCTION CONTOURS OR BETTER, AND STABILIZING THE STREAM CHANNEL PRIOR TO REESTABLISHING FLOW.
16. ALL EXCESS EXCAVATED MATERIAL SHALL BE REMOVED FROM THE STREAM FLOODWAY PRIOR TO PERMANENTLY STABILIZING STREAM BANKS; AND,
17. ALL DISTURBED AREAS WITHIN 50 FEET OF TOP OF BANK AND 100 FEET IN SPECIAL PROTECTION WATERSHEDS SHOULD BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR STREAMS OR 48 HOURS OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED. APPROPRIATE STREAM BANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.
18. KEEP LIME AND FERTILIZERS OUT OF STREAM.
19. TEMPORARY CROSSINGS WILL STAY IN PLACE FOR NO GREATER THAN ONE YEAR.



TYPICAL PIPELINE INSTALLATION STREAM CROSSING - PUMP BYPASS DETAIL
NOT TO SCALE

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SHEET 10
SHEET 10 OF 22

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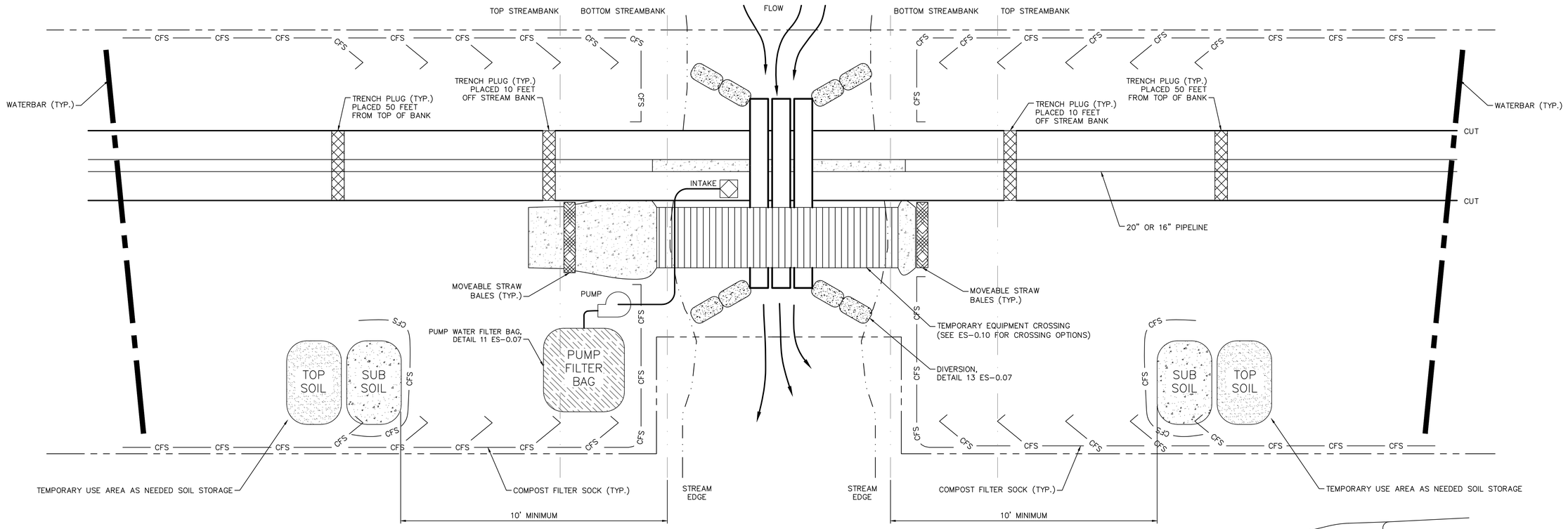
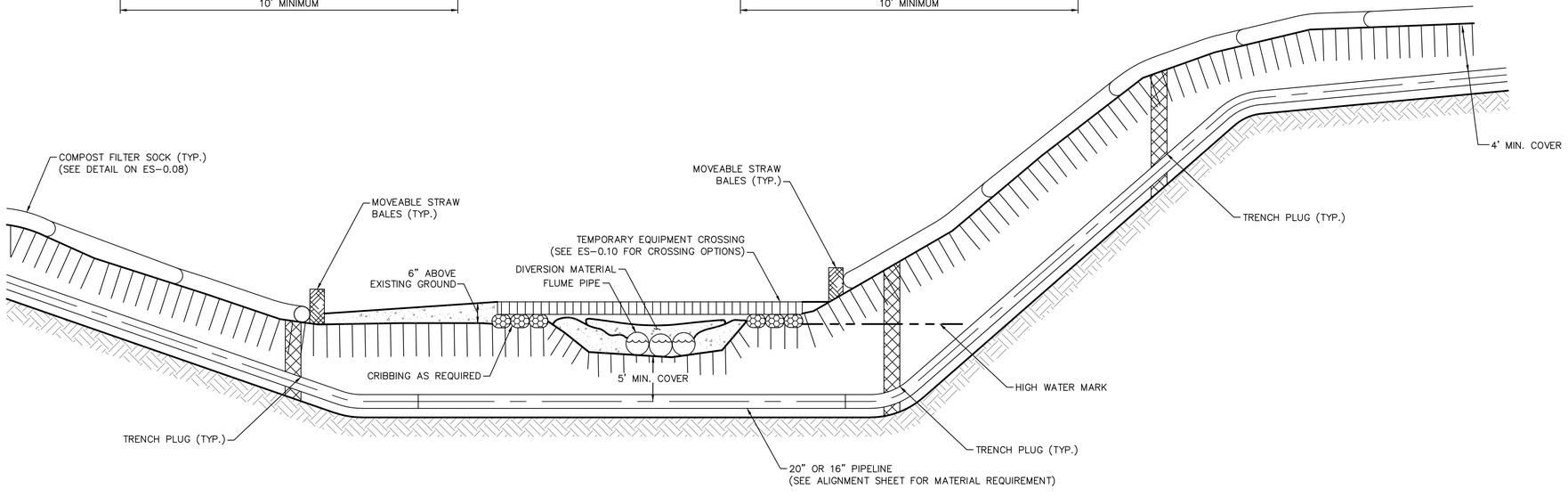


NOTES:

1. SEE PLAN SHEETS FOR FLOODWAY AND FLOODPLAIN LOCATIONS AND FOR REFERENCE TO SITE-SPECIFIC STREAM CORRING DRAWINGS.
2. THE FLUME SHOULD BE OF SUFFICIENT SIZE TO CONVEY NORMAL STREAM FLOW OVER THE OPEN TRENCH (MINIMUM SIZE OF 12 INCHES);
3. FLUME PIPE MUST BE ONE CONTINUOUS PIPE LONG ENOUGH TO ACCOUNT FOR THE POSSIBILITY OF THE TRENCH WIDENING UNEXPECTEDLY DURING THE EXCAVATION (DUE TO SLOUGHING);
4. FLUME SHALL BE INSTALLED PRIOR TO TRENCH EXCAVATION AT THAT LOCATION; AND,
5. AN EFFECTIVE SEAL MUST BE CREATED AROUND THE FLUME(S). ONCE IN PLACE, THE FLUMES ARE NOT REMOVED UNTIL THE PIPELINE HAS BEEN INSTALLED AND THE STREAMBED AND BANKS HAVE BEEN RESTORED.
6. WATERBARS ARE TO BE PLACED 50 FEET FROM TOP OF BANK EXCEPT AS NOTED ON SITE SPECIFIC PLAN DRAWINGS.
7. MARK THE TOP OF STREAMBANK WITH HIGH VISIBLE FLAGGING AND POST RESOURCE AND NO REFUELING SIGNS WITHIN 100 FEET OF TOP OF STREAMBANK;
8. HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM TOP OF STREAMBANK;
9. GRUBBING SHALL NOT TAKE PLACE WITHIN 50 FEET OF TOP OF BANK PRIOR TO STREAM INSTALLATION WITH THE EXCEPTION OF THE TRAVEL LANE UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE AND PIPE IS READY FOR INSTALLATION;
10. CONSTRUCT DAMS WITH SAND BAGS, JERSEY BARRIERS OR SIMILAR MATERIAL WITH AN IMPERVIOUS LINER EXTENDED TO THE STREAM BOTTOM AND SECURED WITH SANDBAGS (SEE ES-0.07) MAINTAINING AMBIENT DOWNSTREAM FLOW RATES;
11. NATURAL STREAM BED MATERIAL TO BE STRIPPED AND SEGREGATED FROM SUBSURFACE MATERIAL FOR FINAL STREAMBED RESTORATION. EXCAVATION PORTION OF NATIVE STREAM BEDS COMPRISED OF ROCK, COBBLE, OR GRAVEL ARE TO BE STRIPPED AND SEGREGATED AND USED DURING STREAM RESTORATION.
12. REMOVE ALL CONSTRUCTION MATERIAL AND STRUCTURES FROM THE WATERBODY AFTER CONSTRUCTION;
13. RESTORE STREAM CHANNELS AND BOTTOMS TO THEIR PRECONSTRUCTION CONTOURS OR BETTER, AND STABILIZING THE STREAM CHANNEL PRIOR TO REESTABLISHING FLOW.
14. ALL EXCESS EXCAVATED MATERIAL SHALL BE REMOVED FROM THE STREAM FLOODWAY PRIOR TO PERMANENTLY STABILIZING STREAM BANKS; AND,
15. ALL DISTURBED AREAS WITHIN 50 FEET OF TOP OF BANK AND 100 FEET IN SPECIAL PROTECTION WATERSHEDS SHOULD BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR STREAMS OR 48 HOURS OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED. APPROPRIATE STREAM BANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.
16. KEEP LIME AND FERTILIZERS OUT OF STREAM.
17. TEMPORARY CROSSINGS WILL STAY IN PLACE FOR NO GREATER THAN ONE YEAR.



TYPICAL PIPELINE INSTALLATION STREAM CROSSING – DRY FLUME DETAIL
NOT TO SCALE

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REVISIONS

NO.	BY	DATE	REMARKS

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

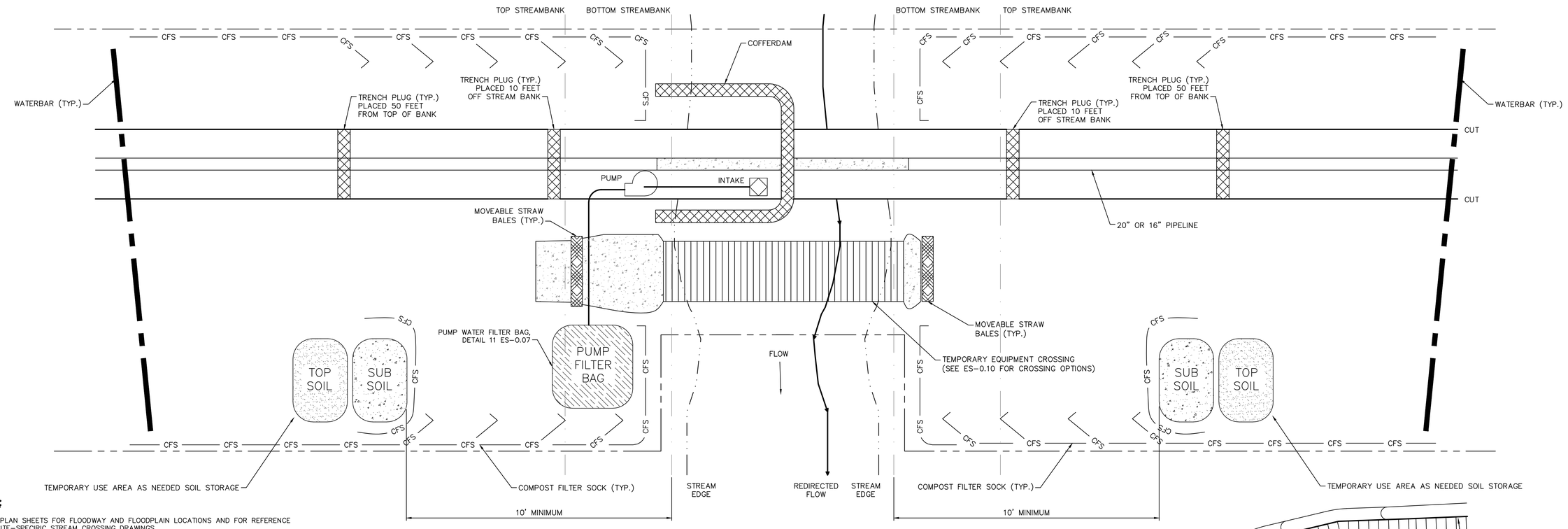
PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL &
SITE RESTORATION PLAN
NOTES & DETAILS

DATE:	NOVEMBER 2016
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

SHEET 11
SHEET 11 OF 22



NOTES:

1. SEE PLAN SHEETS FOR FLOODWAY AND FLOODPLAIN LOCATIONS AND FOR REFERENCE TO SITE-SPECIRIC STREAM CROSSING DRAWINGS.
2. MAINTAIN ADEQUATE IN-STREAM PASSAGE OF WATER (MIN 1/3 THE DISTANCE OF THE CROSSING) AT ALL TIMES TO CONVEY NORMAL STREAM FLOW WITHOUT CREATING ACCELERATED BANK EROSION;
3. PREPARE STREAM BED FOR CONSTRUCTION OF COFFERDAM BY REMOVING LARGE BOULDERS AND OTHER OBJECTS THAT MAY PREVENT AN ADEQUATE DAM SEAL;
4. DRAW DOWN WATER WITHIN COFFERDAM STRUCTURE AND PUMP INTO WATERBODY;
5. PREPARE SMALL TRENCH OR BERM AROUND INTERIOR OF COFFERDAM AND LOCATE SUMP AS DEPICTED FOR CONTINUOUS PUMPING OF ANY ADDITIONAL WATER INFILTRATION INTO COFFERDAM STRUCTURE SPACE AND TRENCH. CONTINUED PUMPING DURING CONSTRUCTION ACTIVITIES SHALL BE DIRECTED TO A DEWATERING STRUCTURE.
6. INSTALL TIMBER MATS ALONG CONSTRUCTION TRAVEL LANE, IF REQUIRED.
7. EXCAVATE THE PIPELINE TRENCH AS NECESSARY,
8. DEWATER TRENCH TO ENSURE THAT IT IS SUITABLE FOR WORKER ENTRANCE TO COMPLETE A TIE-IN WELD. SHOULD THE TRENCH FAIL AND PROVE TO BE UNSAFE FOR WORKERS, DISCUSS OPTIONS WITH AGENCIES.
9. INSTALL CROSSING PIPE AND SANDBAGS OR PREFABRICATED CONCRETE WALL ADJACENT TO THE WELD CAP WHICH WILL FORM A BARRIER TO PREVENT MOVEMENT OF RE-INSTALLED TRENCH SPOIL WHILE THE EAST SIDE OF THE CROSSING IS CONSTRUCTED.
10. RETURN TRENCH SPOIL TO TRENCH AND COVER PIPELINE. RESTORE RIVER BED WITH SEGREGATED RIVER BED SEDIMENT AND ROCK MATERIAL.
11. PUMP RIVER WATER INTO COFFERDAM STRUCTURE AND ALLOW ALL SEDIMENTATION TO SETTLE.
12. DISASSEMBLE COFFERDAM STRUCTURE;
13. RESTORE RIVER BANK PRECONSTRUCTION CONTOURS TO A STABLE ANGLE OF REPOSE.
14. REPEAT STEPS ON OPPOSITE SIDE OF WATERBODY.
15. WATERBARS ARE TO BE PLACED 50 FEET FROM TOP OF BANK EXCEPT AS NOTED ON SITE SPECIFIC PLAN DRAWINGS.
16. MARK THE TOP OF STREAMBANK WITH HIGH VISIBLE FLAGGING AND POST RESOURCE AND NO REFUELING SIGNS WITHIN 100 FEET OF TOP OF STREAMBANK;
17. HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM TOP OF STREAMBANK;
18. GRUBBING SHALL NOT TAKE PLACE WITHIN 50 FEET OF TOP OF BANK PRIOR TO STREAM INSTALLATION WITH THE EXCEPTION OF THE TRAVEL LANE UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE AND PIPE IS READY FOR INSTALLATION;
19. CONSTRUCT DAMS WITH SAND BAGS, JERSEY BARRIERS OR SIMILAR MATERIAL WITH AN IMPERVIOUS LINER EXTENDED TO THE STREAM BOTTOM AND SECURED WITH SANDBAGS (SEE ES-0.07) MAINTAINING AMBIENT DOWNSTREAM FLOW RATES;
20. NATURAL STREAM BED MATERIAL TO BE STRIPPED AND SEGREGATED FROM SUBSURFACE MATERIAL FOR FINAL STREAMBED RESTORATION. EXCAVATION PORTION OF NATIVE STREAM BEDS COMPRISED OF ROCK, COBBLE, OR GRAVEL ARE TO BE STRIPPED AND SEGREGATED AND USED DURING STREAM RESTORATION.
21. REMOVE ALL CONSTRUCTION MATERIAL AND STRUCTURES FROM THE WATERBODY AFTER CONSTRUCTION.
22. RESTORE STREAM CHANNELS AND BOTTOMS TO THEIR PRECONSTRUCTION CONTOURS OR BETTER, AND STABILIZING THE STREAM CHANNEL PRIOR TO REESTABLISHING FLOW.
23. ALL EXCESS EXCAVATED MATERIAL SHALL BE REMOVED FROM THE STREAM FLOODWAY PRIOR TO PERMANENTLY STABILIZING STREAM BANKS; AND,
24. ALL DISTURBED AREAS WITHIN 50 FEET OF TOP OF BANK AND 100 FEET IN SPECIAL PROTECTION WATERSHEDS SHOULD BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR STREAMS OR 48 HOURS OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED. APPROPRIATE STREAM BANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.
25. KEEP LIME AND FERTILIZER OUT OF STREAM.
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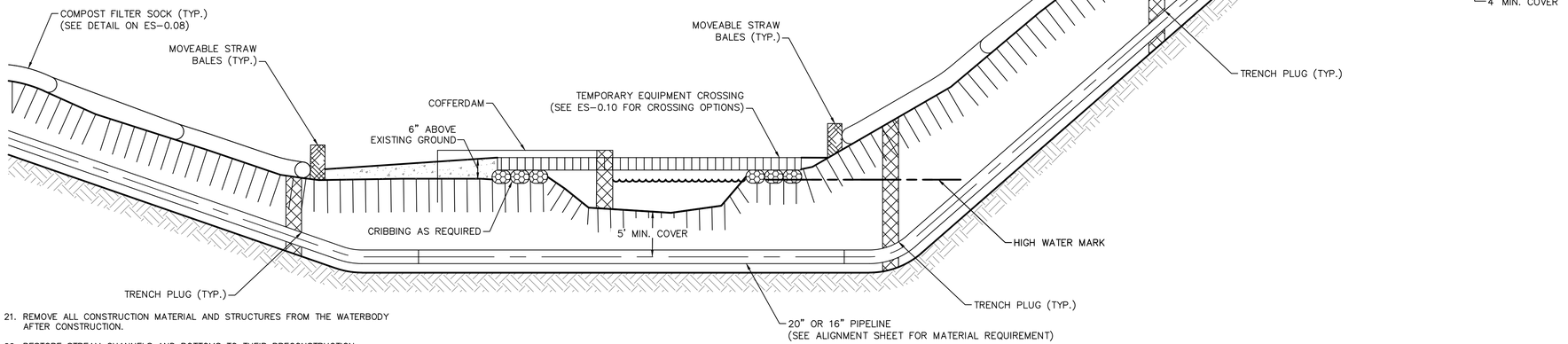

TYPICAL PIPELINE INSTALLATION STREAM CROSSING – COFFERDAM DETAIL
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CHECKED BY:	RS

SHEET 12
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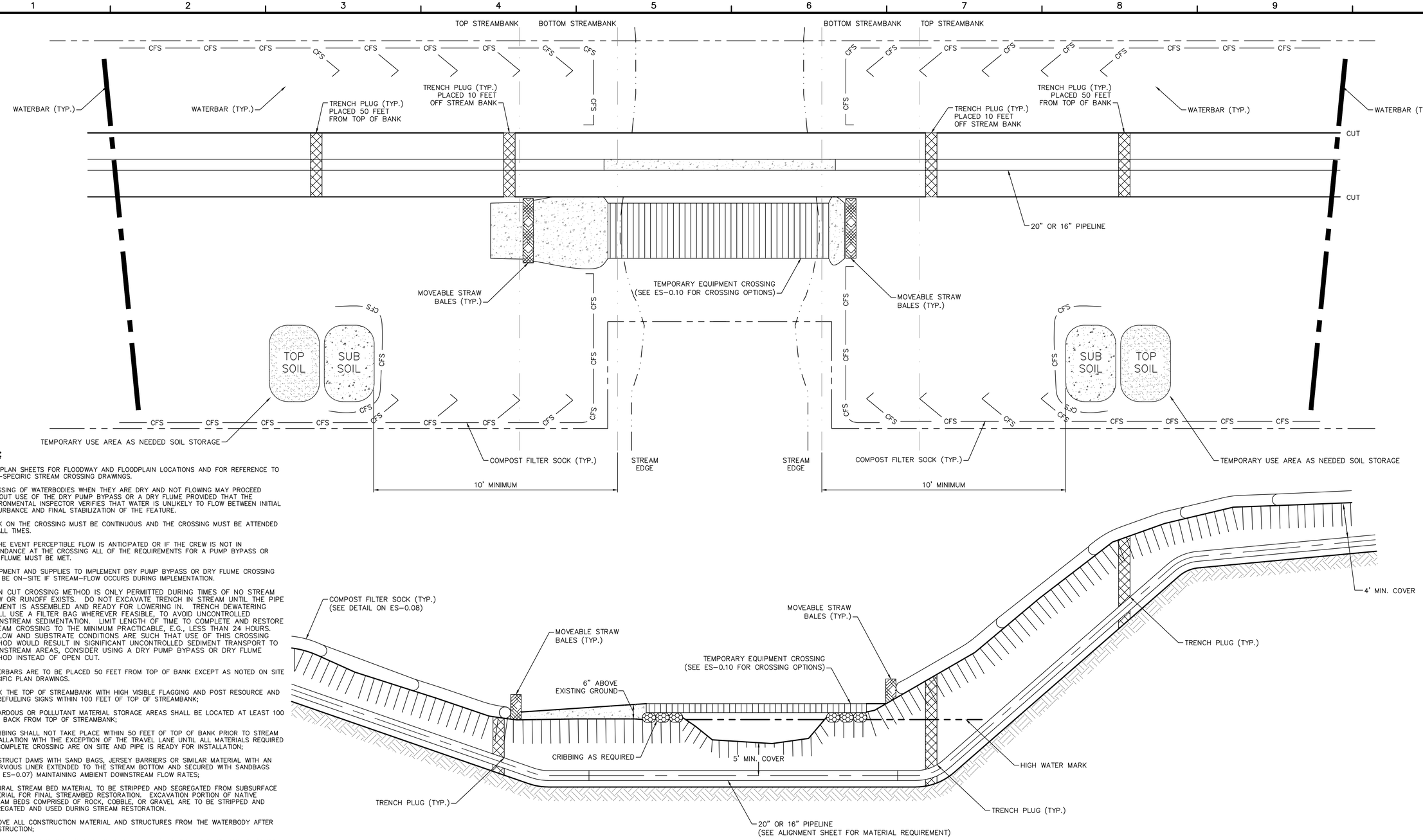

NOTES:

1. SEE PLAN SHEETS FOR FLOODWAY AND FLOODPLAIN LOCATIONS AND FOR REFERENCE TO SITE-SPECIRIC STREAM CROSSING DRAWINGS.
2. CROSSING OF WATERBODIES WHEN THEY ARE DRY AND NOT FLOWING MAY PROCEED WITHOUT USE OF THE DRY PUMP BYPASS OR A DRY FLUME PROVIDED THAT THE ENVIRONMENTAL INSPECTOR VERIFIES THAT WATER IS UNLIKELY TO FLOW BETWEEN INITIAL DISTURBANCE AND FINAL STABILIZATION OF THE FEATURE.
3. WORK ON THE CROSSING MUST BE CONTINUOUS AND THE CROSSING MUST BE ATTENDED AT ALL TIMES.
4. IN THE EVENT PERCEPTIBLE FLOW IS ANTICIPATED OR IF THE CREW IS NOT IN ATTENDANCE AT THE CROSSING ALL OF THE REQUIREMENTS FOR A PUMP BYPASS OR DRY FLUME MUST BE MET.
5. EQUIPMENT AND SUPPLIES TO IMPLEMENT DRY PUMP BYPASS OR DRY FLUME CROSSING WILL BE ON-SITE IF STREAM-FLOW OCCURS DURING IMPLEMENTATION.
6. OPEN CUT CROSSING METHOD IS ONLY PERMITTED DURING TIMES OF NO STREAM FLOW OR RUNOFF EXISTS. DO NOT EXCAVATE TRENCH IN STREAM UNTIL THE PIPE SEGMENT IS ASSEMBLED AND READY FOR LOWERING IN. TRENCH DEWATERING SHALL USE A FILTER BAG WHEREVER FEASIBLE, TO AVOID UNCONTROLLED DOWNSTREAM SEDIMENTATION. LIMIT LENGTH OF TIME TO COMPLETE AND RESTORE STREAM CROSSING TO THE MINIMUM PRACTICABLE, E.G., LESS THAN 24 HOURS. IF FLOW AND SUBSTRATE CONDITIONS ARE SUCH THAT USE OF THIS CROSSING METHOD WOULD RESULT IN SIGNIFICANT UNCONTROLLED SEDIMENT TRANSPORT TO DOWNSTREAM AREAS, CONSIDER USING A DRY PUMP BYPASS OR DRY FLUME METHOD INSTEAD OF OPEN CUT.
7. WATERBARS ARE TO BE PLACED 50 FEET FROM TOP OF BANK EXCEPT AS NOTED ON SITE SPECIFIC PLAN DRAWINGS.
8. MARK THE TOP OF STREAMBANK WITH HIGH VISIBLE FLAGGING AND POST RESOURCE AND NO REFUELING SIGNS WITHIN 100 FEET OF TOP OF STREAMBANK;
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17. KEEP LIME AND FERTILIZER OUT OF STREAM.
18. TEMPORARY CROSSINGS WILL STAY IN PLACE FOR NO GREATER THAN ONE YEAR.

TYPICAL PIPELINE INSTALLATION STREAM CROSSING - DRY OPEN CUT DETAIL
NOT TO SCALE

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SHEET 13
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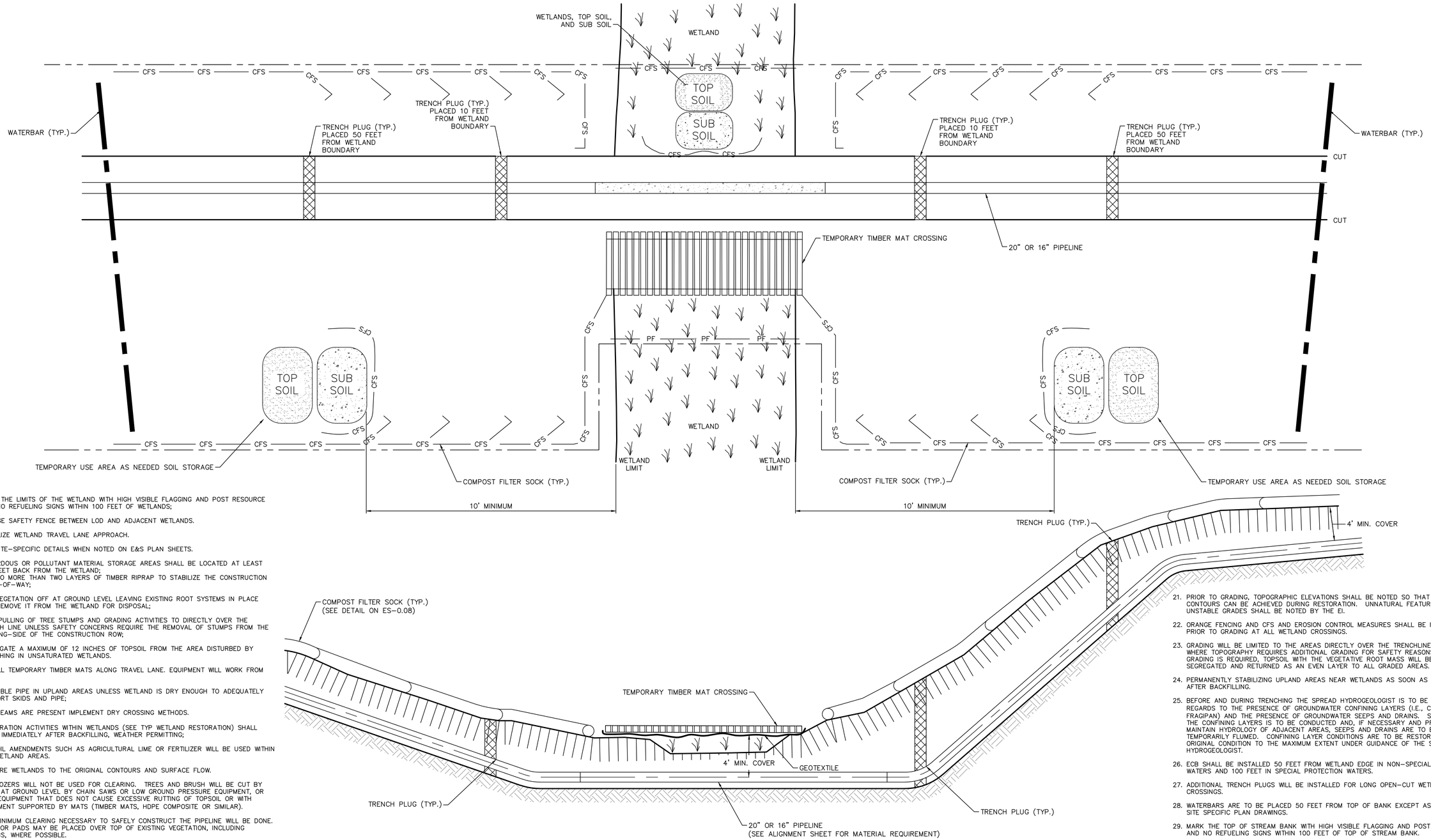

TYPICAL PIPELINE INSTALLATION WETLAND CROSSING DETAIL
NOT TO SCALE

NOTES:

1. MARK THE LIMITS OF THE WETLAND WITH HIGH VISIBLE FLAGGING AND POST RESOURCE AND NO REFUELING SIGNS WITHIN 100 FEET OF WETLANDS;
2. ORANGE SAFETY FENCE BETWEEN LOD AND ADJACENT WETLANDS.
3. STABILIZE WETLAND TRAVEL LANE APPROACH.
4. SEE SITE-SPECIFIC DETAILS WHEN NOTED ON E&S PLAN SHEETS.
5. HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM THE WETLAND;
6. USE NO MORE THAN TWO LAYERS OF TIMBER RIPRAP TO STABILIZE THE CONSTRUCTION RIGHT-OF-WAY;
7. CUT VEGETATION OFF AT GROUND LEVEL LEAVING EXISTING ROOT SYSTEMS IN PLACE AND REMOVE IT FROM THE WETLAND FOR DISPOSAL;
8. LIMIT PULLING OF TREE STUMPS AND GRADING ACTIVITIES TO DIRECTLY OVER THE TRENCH LINE UNLESS SAFETY CONCERNS REQUIRE THE REMOVAL OF STUMPS FROM THE WORKING-SIDE OF THE CONSTRUCTION ROW;
9. SEGREGATE A MAXIMUM OF 12 INCHES OF TOPSOIL FROM THE AREA DISTURBED BY TRENCHING IN UNSATURATED WETLANDS.
10. INSTALL TEMPORARY TIMBER MATS ALONG TRAVEL LANE. EQUIPMENT WILL WORK FROM MATS;
11. ASSEMBLE PIPE IN UPLAND AREAS UNLESS WETLAND IS DRY ENOUGH TO ADEQUATELY SUPPORT SKIDS AND PIPE;
12. IF STREAMS ARE PRESENT IMPLEMENT DRY CROSSING METHODS.
13. RESTORATION ACTIVITIES WITHIN WETLANDS (SEE TYP WETLAND RESTORATION) SHALL BEGIN IMMEDIATELY AFTER BACKFILLING, WEATHER PERMITTING;
14. NO SOIL AMENDMENTS SUCH AS AGRICULTURAL LIME OR FERTILIZER WILL BE USED WITHIN THE WETLAND AREAS.
15. RESTORE WETLANDS TO THE ORIGINAL CONTOURS AND SURFACE FLOW.
16. BULLDOZERS WILL NOT BE USED FOR CLEARING. TREES AND BRUSH WILL BE CUT BY HAND AT GROUND LEVEL BY CHAIN SAWS OR LOW GROUND PRESSURE EQUIPMENT, OR WITH EQUIPMENT THAT DOES NOT CAUSE EXCESSIVE RUTTING OF TOPSOIL OR WITH EQUIPMENT SUPPORTED BY MATS (TIMBER MATS, HDPE COMPOSITE OR SIMILAR).
17. THE MINIMUM CLEARING NECESSARY TO SAFELY CONSTRUCT THE PIPELINE WILL BE DONE. MATS OR PADS MAY BE PLACED OVER TOP OF EXISTING VEGETATION, INCLUDING SHRUBS, WHERE POSSIBLE.
18. STUMPS WILL BE LEFT IN PLACE, EXCEPT ON THE TRENCH LINE OR UNLESS THE REMOVAL IS NECESSARY TO ENSURE WORKER SAFETY. STUMPS MAY BE GROUND TO A SUITABLE HEIGHT FOR SAFETY REASONS.
19. ALL CUT TIMBER AND BRUSH WILL BE REMOVED FROM WETLANDS. GRINDINGS WILL BE REMOVED AS MUCH AS PRACTICAL. DEBRIS AND STUMPS WILL NOT BE BURIED.
20. CONTRACTOR SHALL BE REQUIRED TO INSTALL COMPLETED MAT TRAVEL LANE FOR PIPELINE CONSTRUCTION DURING THE TIME CONTRACTOR'S CLEARING CREW 9DOES NOT MEAN TREE FELLING) IS PERFORMING ITS WORK.
21. PRIOR TO GRADING, TOPOGRAPHIC ELEVATIONS SHALL BE NOTED SO THAT ORIGINAL CONTOURS CAN BE ACHIEVED DURING RESTORATION. UNNATURAL FEATURES AND UNSTABLE GRADES SHALL BE NOTED BY THE EI.
22. ORANGE FENCING AND CFS AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO GRADING AT ALL WETLAND CROSSINGS.
23. GRADING WILL BE LIMITED TO THE AREAS DIRECTLY OVER THE TRENCHLINE, EXCEPT WHERE TOPOGRAPHY REQUIRES ADDITIONAL GRADING FOR SAFETY REASONS. WHEN GRADING IS REQUIRED, TOPSOIL WITH THE VEGETATIVE ROOT MASS WILL BE STRIPPED, SEGREGATED AND RETURNED AS AN EVEN LAYER TO ALL GRADED AREAS.
24. PERMANENTLY STABILIZING UPLAND AREAS NEAR WETLANDS AS SOON AS POSSIBLE AFTER BACKFILLING.
25. BEFORE AND DURING TRENCHING THE SPREAD HYDROGEOLOGIST IS TO BE CONSULTED IN REGARDS TO THE PRESENCE OF GROUNDWATER CONFINING LAYERS (I.E., CLAY, FRAGIPAN) AND THE PRESENCE OF GROUNDWATER SEEPS AND DRAINS. SEGREGATION OF THE CONFINING LAYERS IS TO BE CONDUCTED AND, IF NECESSARY AND PRACTICABLE TO MAINTAIN HYDROLOGY OF ADJACENT AREAS, SEEPS AND DRAINS ARE TO BE TEMPORARILY FLUMED. CONFINING LAYER CONDITIONS ARE TO BE RESTORED TO THE ORIGINAL CONDITION TO THE MAXIMUM EXTENT UNDER GUIDANCE OF THE SPREAD HYDROGEOLOGIST.
26. ECB SHALL BE INSTALLED 50 FEET FROM WETLAND EDGE IN NON-SPECIAL PROTECTION WATERS AND 100 FEET IN SPECIAL PROTECTION WATERS.
27. ADDITIONAL TRENCH PLUGS WILL BE INSTALLED FOR LONG OPEN-CUT WETLAND CROSSINGS.
28. WATERBARS ARE TO BE PLACED 50 FEET FROM TOP OF BANK EXCEPT AS NOTED ON SITE SPECIFIC PLAN DRAWINGS.
29. MARK THE TOP OF STREAM BANK WITH HIGH VISIBLE FLAGGING AND POST RESOURCE AND NO REFUELING SIGNS WITHIN 100 FEET OF TOP OF STREAM BANK.
30. HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM WETLAND EDGE.
31. AVOID SAND BLASTING IN WETLANDS TO THE EXTENT PRACTICABLE. IF SANDBLASTING IS PERFORMED WITHIN A WETLAND, THE CONTRACTOR SHALL PLACE A TARP OR SUITABLE MATERIAL IN SUCH A WAY AS TO COLLECT AS MUCH WASTE SHOT AS POSSIBLE AND DISPOSE OF THE COLLECTED WASTE. THE CONTRACTOR SHALL CLEAN UP ALL VISIBLE DEPOSITS OF WASTES AND DISPOSE OF THE WASTE AT AN APPROVED DISPOSAL FACILITY.
32. ANY EXCESS FILL MATERIAL MUST BE REMOVED AND NOT SPREAD WITHIN THE WETLAND.

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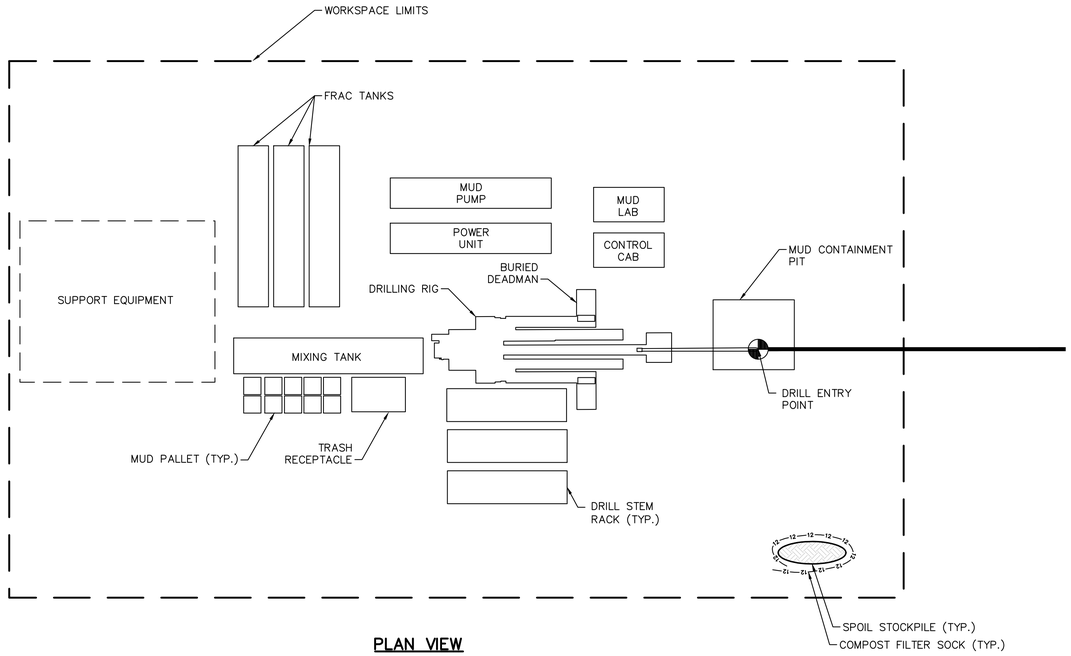
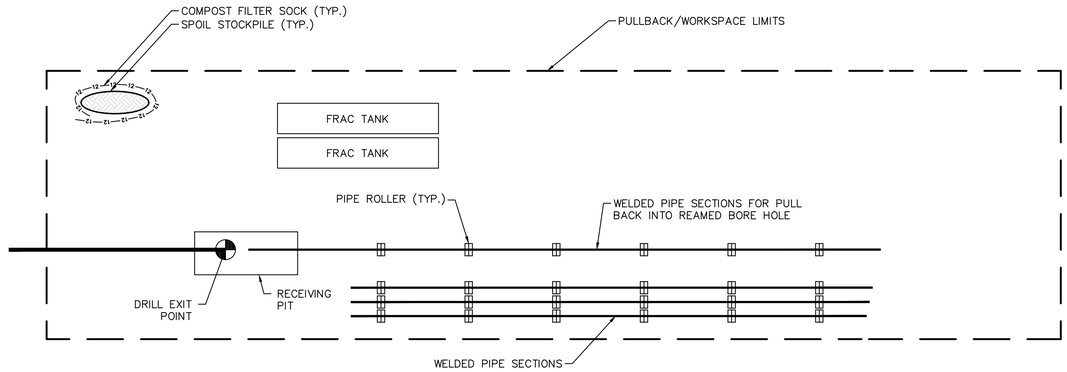


PLAN VIEW

ENTRY SIDE LAYOUT
NOT TO SCALE



PLAN VIEW

EXIT SIDE LAYOUT
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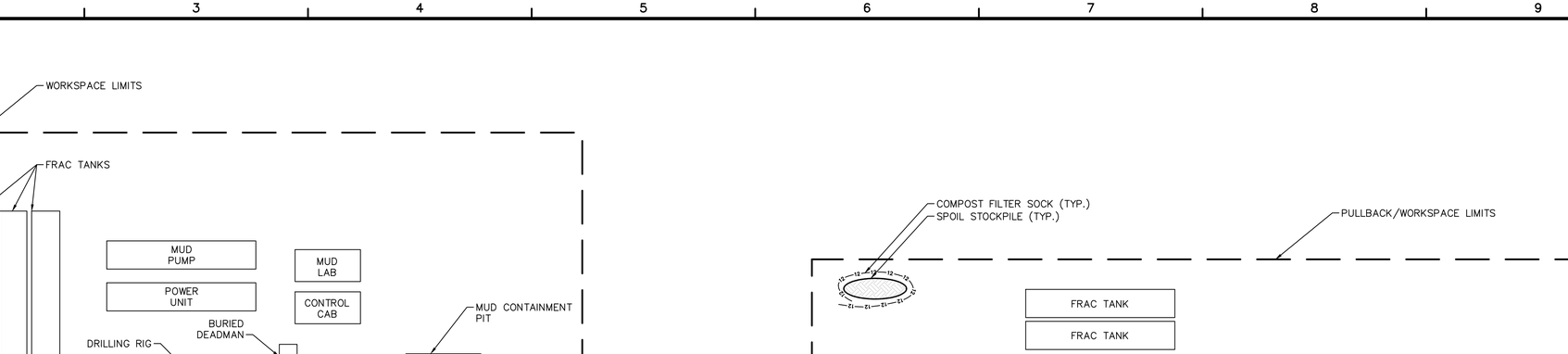

PROFILE VIEW

TYPICAL HDD BORE LAYOUT
NOT TO SCALE

NOTES:

1. REVIEW INADVERTENT RETURN AND PROJECT PPC PLANS AHEAD OF CONSTRUCTION FOR PRECONSTRUCTION ACTIVITIES, NOTIFICATIONS, AND CONDITIONS. MAKE ALL APPROPRIATE NOTIFICATIONS. IMPLEMENT THESE PLANS DURING CONSTRUCTION.
2. REVIEW HDD FOR WRITTEN ATON PLAN AND IMPLEMENT IF TELEMETRY WIRE IS TO BE USED FOR BORE TRACKING.
3. SEE SITE PLANS FOR E&S CONTROLS.
4. LAYOUT WILL VARY ACCORDING TO AVAILABLE WORK SPACE AND FIELD CONDITIONS.
5. GRADE AND TOPSOIL WORKSPACES WHERE NECESSARY TO MAKE WORKSPACE AVAILABLE FOR PARKING, STAGING, AND OTHER USES WHEN NOT BEING USED FOR BORING.
6. HDD BENEATH WETLAND AND WATERBODIES WHERE INDICATED ON E&S PLAN SHEETS. SEE SITE-SPECIFIC DRAWINGS IF NOTED TO BE AVAILABLE.
7. INSTALL TEMPORARY TIMBER WETLAND MATS IF WORKSPACES ARE IN WETLANDS.
8. TEMPORARY WATERBAR TO BE INSTALLED AFTER CLEARING AND PRIOR TO TEMPORARY GRADING IF NEEDED FOR HDD INSTALLATION.
9. PERMANENT WATERBAR TO BE INSTALLED AFTER CLEARING AND PRIOR TO TEMPORARY GRADING IF NEEDED FOR HDD INSTALLATION AND REINSTALLED ONCE FINAL GRADING ESTABLISHED.
10. TELEMETRY WIRE WILL BE STRUNG FROM ENTRY TO EXIT POINTS.
11. INSTALL COMPOST FILTER SOCKS/SILT FENCE ALONG THE DOWN GRADIENT PERIMETERS OF THE HDD BORE PIT.
12. EXCAVATION OF THE DRILL ENTRY AND EXIT LOCATIONS WILL BE NECESSARY TO CONTAIN DRILLING FLUIDS DURING ALL PHASES OF INSTALLATION. THESE FLUIDS AND CUTTINGS MUST BE DISPOSED OF IN AN APPROVED MANNER PERIODICALLY OR AT THE COMPLETE CROSSING INSTALLATION.
13. THE CROSSING LENGTH AND CROSS SECTIONAL GEOMETRY IS DEPENDENT UPON THE PIPELINE DESIGN PARAMETERS, THE OBSTACLE CROSSED, AND THE SUBSURFACE CONDITIONS.

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REVISIONS

NO.	BY	DATE	REMARKS

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL &
SITE RESTORATION PLAN
NOTES & DETAILS

DATE:	NOVEMBER 2016
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

SHEET 15
SHEET 15 OF 22

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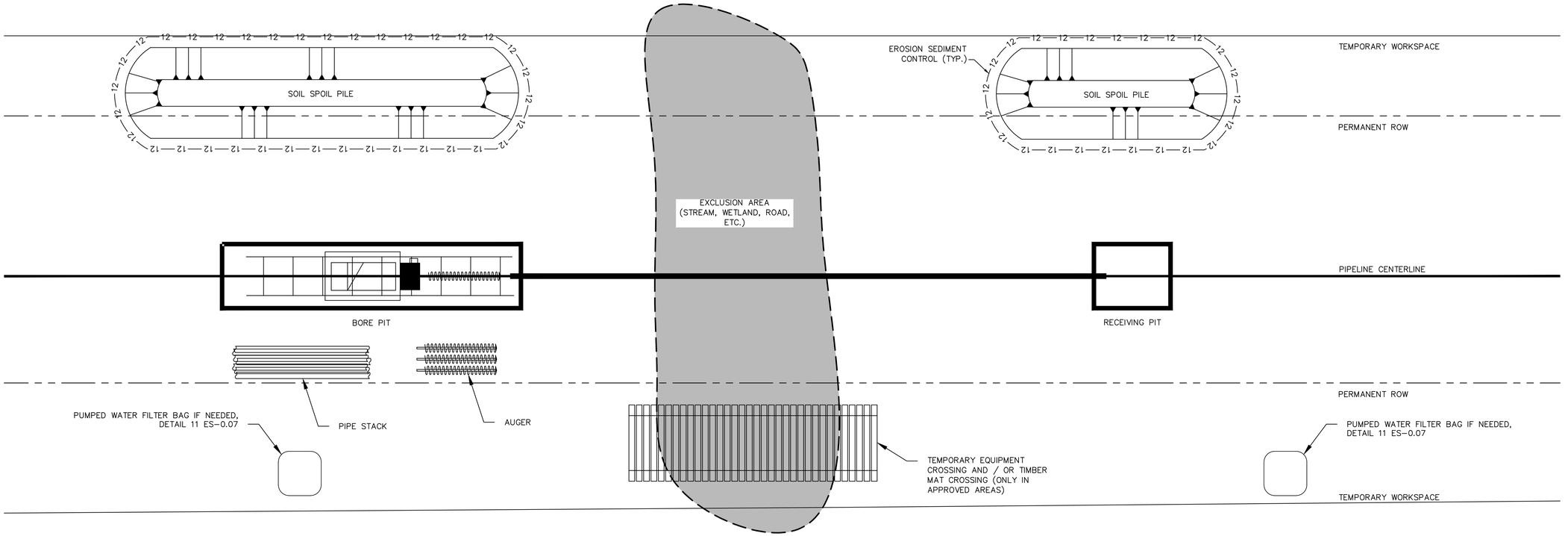
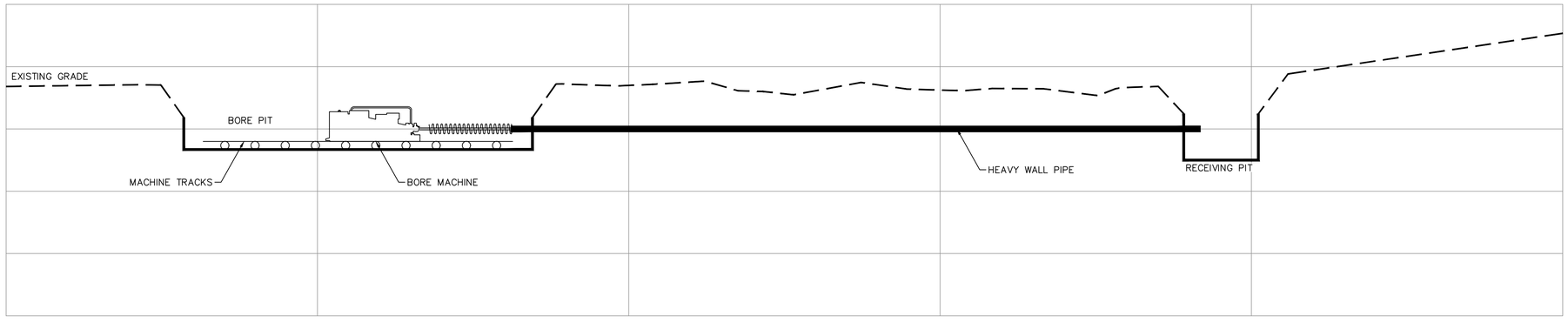


PLAN VIEW



PROFILE VIEW

TYPICAL CONVENTIONAL BORE CROSSING LAYOUT
NOT TO SCALE

NOTES:

1. LAYOUT WILL VARY ACCORDING TO AVAILABLE WORK SPACE AND FIELD CONDITIONS.
2. WORKSPACE AVAILABLE FOR PARKING, STAGING, AND OTHER USES WHEN NOT BEING USED FOR BORING.
2. INSTALL COMPOST FILTER SOCKS/SILT FENCE ALONG THE DOWN GRADIENT PERIMETERS OF THE BORE PITS. SEE SITE PLANS FOR E&S CONTROLS.
3. EXCAVATE BORE PITS IN ACCORDANCE WITH SITE-SPECIFIC PLANS AND SEGREGATE TOP SOIL IN ACCORDANCE WITH STANDARD E&SC PLAN NOTES. POSITION BORE PITS A MINIMUM OF 50 FEET FROM THE NEAREST TOP OF BANK, WHERE TECHNICALLY FEASIBLE.
4. THE CROSSING LENGTH IS DEPENDENT UPON THE OBSTACLE TO BE CROSSED, AND THE SURFACE AND SUBSURFACE CONDITIONS.

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SHEET 16
SHEET 16 OF 22

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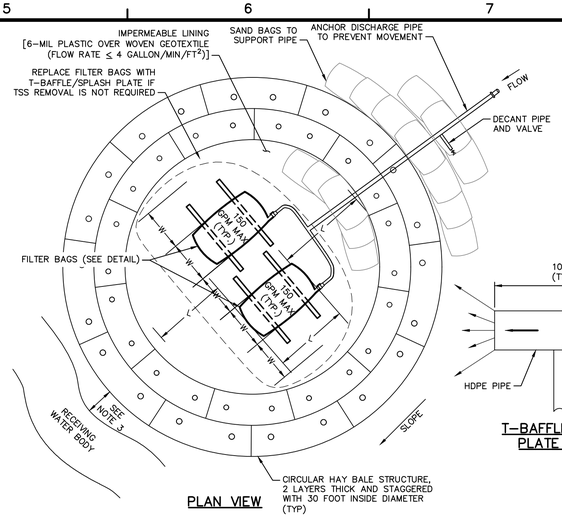
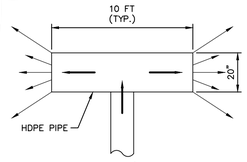
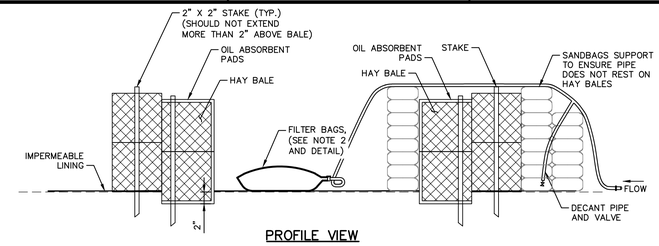


PLAN VIEW



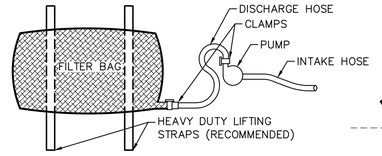
T-BAFFLE/SPLASH PLATE DETAIL



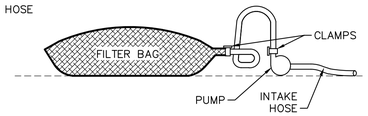
PROFILE VIEW

NOTES:

1. NOTICE OF INTENT MUST BE SUBMITTED AND NOTIFICATION OF PERMIT COVERAGE RECEIVED PRIOR TO DISCHARGING HYDROSTATIC TEST WATER.
2. HYDROSTATIC TEST WATER DISCHARGE STRUCTURE WILL BE LOCATED WITHIN THE PROJECT RIGHT-OF-WAY OR OTHER ESTABLISHED RIGHT-OF-WAY APPROVED BY SUNOCO AND LANDOWNER. INCREASE SIZE OF DISCHARGE STRUCTURE AND NUMBER OF FILTER BAGS TO MATCH REQUIRED DISCHARGE RATE AND TSS REMOVAL AS LONG AS REQUIRED LAND IS AVAILABLE. ADD ADDITIONAL SMALLER DISCHARGE STRUCTURES IF SPACE IS LIMITED. ELIMINATE FILTER BAG(S) IF TSS REMOVAL NOT REQUIRED AND REPLACE WITH T-BAFFLE/ SPLASH PLATE.
3. HYDROSTATIC WATER DISCHARGE STRUCTURE WILL BE LOCATED AT LEAST 100 FEET FROM THE EDGE OF A DELINEATED WETLAND, AND 50 FEET OR THE CHANNEL WIDTH, WHICHEVER IS GREATER, FROM THE TOP OF BANK OF A RECEIVING STREAM.
4. HYDROSTATIC WATER DISCHARGE STRUCTURE WILL BE LOCATED SUCH THAT IT DRAINS TO A WELL-VEGETATED AREA WITH SLOPES BETWEEN 1% AND 5% TOWARD THE RECEIVING WATERBODY.
5. HYDROSTATIC TEST WATER MUST BE SAMPLED AND ANALYZED TO CONFIRM COMPLIANCE WITH PARAMETERS IDENTIFIED IN PADEP PAG-10 GENERAL PERMIT FOR DISCHARGE FROM HYDROSTATIC TESTING OF TANKS AND PIPELINES AND THE APPROVED SAMPLING AND ANALYSIS PROGRAM FOR HYDROSTATIC TEST WATERS FOR PIPP IN PENNSYLVANIA.
6. THE DISCHARGE RATE TO THE STRUCTURE SHOULD BE LIMITED TO THE LOWEST POSSIBLE RATE TO MINIMIZE ANY POTENTIAL IMPACT ON AQUATIC LIFE AND TO REDUCE THE POTENTIAL FOR EROSION (E.G., 150 GPM).
7. IF MUNICIPAL WATER IS USED FOR TESTING, HOLD THE WATER IN THE PIPE FOR AT LEAST 24 HOURS PRIOR TO DISCHARGE TO MEET TOTAL RESIDUAL CHLORINE LIMITS.
8. IMPLEMENT ADDITIONAL EROSION AND SEDIMENT CONTROLS AS REQUIRED IN PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION EROSION AND SEDIMENT CONTROL PROGRAM MANUAL, TECHNICAL GUIDANCE NUMBER 363-2134-008, MARCH 2012.
9. DO NOT DISCHARGE HYDROSTATIC TEST WATER TO EV OR HQ WATERS.
10. DO NOT DISCHARGE HYDROSTATIC TEST WATER TO TROUT STOCKED STREAMS FROM MARCH 1 TO JUNE 15. THE LISTING OF TROUT STOCKED STREAMS CAN BE FOUND ON THE PENNSYLVANIA FISH AND BOAT COMMISSION'S WEBSITE: WWW.FISH.STATE.PA.US.
11. A PREPAREDNESS, PREVENTION, AND CONTINGENCY (PPC) PLAN MUST BE DEVELOPED IN ACCORDANCE WITH PA DEP'S "GUIDELINES FOR THE DEVELOPMENT AND IMPLEMENTATION OF ENVIRONMENTAL EMERGENCY RESPONSE PLANS" (DEP ID 400-2200-001) AND ITS NPDES-SPECIFIC ADDENDUM. THE PPC PLAN MUST BE MAINTAINED ON-SITE AND BE MADE AVAILABLE UPON REQUEST.



PLAN VIEW



ELEVATION VIEW

NOTE:

LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-3751	80 SIEVE

FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME ½ FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS SHALL BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.

THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.

FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

FILTER BAG DETAIL USE IN HAY BALE DISCHARGE STRCTURE
NOT TO SCALE

DISCHARGE STRUCTURES TO BE USED FOR HYDROSTATIC TEST WATER
NOT TO SCALE

HYDROSTATIC DISCHARGE DETAILS

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SHEET 17
SHEET 17 OF 22

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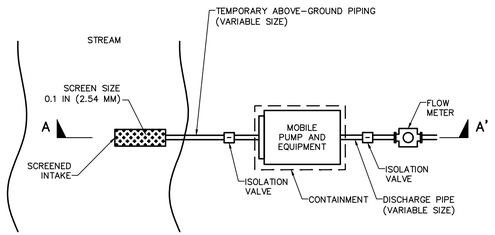
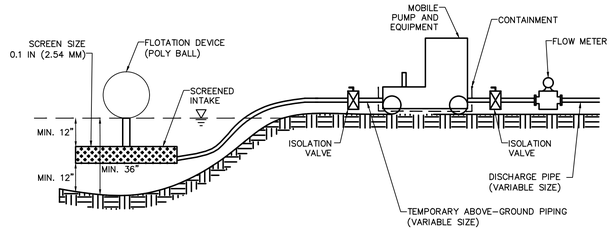


SCHEMATIC PLAN VIEW
NOT TO SCALE

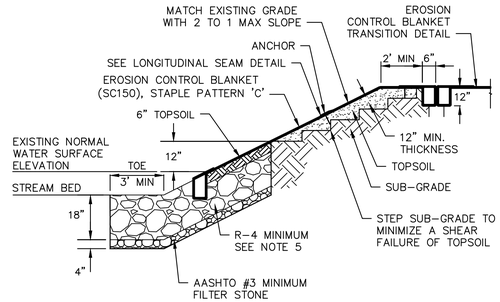


INTAKE ARRANGEMENT SECTION A-A'
NOT TO SCALE

NOTES:

1. PUMP PAD WILL MATCH EXISTING GRADE.
2. SURFACE WATER SOURCE TO BE USED FOR TEMPORARY WATER WITHDRAWALS. ALL TEMPORARY EQUIPMENT WILL BE REMOVED FROM THE FLOODWAY WHEN NOT IN USE. NO DREDGING OR FILLING ACTIVITIES CAN BE COMPLETED WITHIN THE 100-YEAR FLOODWAY WITHOUT ADDITIONAL PERMITS.

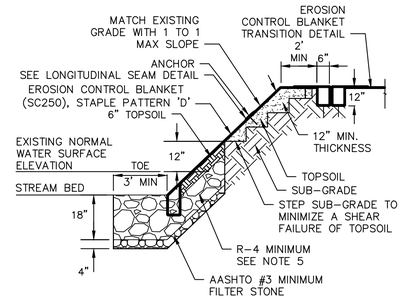
TYPICAL HYDROSTATIC TEST FLOATING INTAKE WITH MOBILE PUMP
NOT TO SCALE



NOTES:

1. A SUITABLE WOVEN OR NON-WOVEN GEOTEXTILE UNDERLAYMENT MUST BE USED IN ACCORDANCE TO MANUFACTURER'S RECOMMENDATIONS.
2. REFER TO NORTH AMERICAN GREEN DETAILS.
3. MATTING WILL EXTEND FROM TOP OF BANK 50' PERPENDICULARLY AWAY FROM TOP OF BANK OR 100' IN HQ/EV WATERSHEDS.
4. NATURAL STREAM BED MATERIAL TO BE STRIPPED AND SEGREGATED FROM SUBSURFACE MATERIAL FOR FINAL STREAMBED RESTORATION.
5. WHERE NATURAL STONE IS REMOVED FROM THE STREAM CROSSING, NATURAL STONE SHALL BE INSTALLED AS TOP 6 INCHES OF RIPRAP.

RIP-RAP BANK STABILIZATION DETAIL
NOT TO SCALE



NOTES:

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2. REFER TO NORTH AMERICAN GREEN DETAILS.
3. MATTING WILL EXTEND FROM TOP OF BANK 50' PERPENDICULARLY AWAY FROM TOP OF BANK OR 100' IN HQ/EV WATERSHEDS.
4. NATURAL STREAM BED MATERIAL TO BE STRIPPED AND SEGREGATED FROM SUBSURFACE MATERIAL FOR FINAL STREAMBED RESTORATION.
5. WHERE NATURAL STONE IS REMOVED FROM THE STREAM CROSSING, NATURAL STONE SHALL BE INSTALLED AS TOP 6 INCHES OF RIPRAP.
6. FOR SLOPES GREATER THAN 1:1 REFER TO SITE SPECIFIC PLANS FOR APPROPRIATE CONTROLS.

STEEP BANK STABILIZATION DETAIL
NOT TO SCALE

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NO.	BY	DATE	REMARKS

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SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL & SITE RESTORATION PLAN NOTES & DETAILS

DATE:	NOVEMBER 2016
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

SHEET 18
SHEET 18 OF 22

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SITE RESTORATION GENERAL NOTES:

1. TOPOGRAPHIC MAPPING AND FEATURES COMPILED FROM WWW.PASDA.PSU.EDU.
2. THE PROJECT TAKES PLACE WITHIN PENNSYLVANIA.
3. TOWNSHIP BOUNDARIES TAKEN FROM WWW.PASDA.PSU.EDU.
4. 100-YEAR FEMA FLOODPLAINS TAKEN FROM WWW.PASDA.PSU.EDU.
5. SEE SHEET ES-0.02 FOR STREAM AND WETLAND CROSSING TABLE.
6. PIPELINE LOCATION AND RIGHT-OF-WAY FROM SUNOCO PIPELINE L.P.
7. USE COMPOST FILTER SOCK AS REQUIRED TO PREVENT RUNOFF FROM SPOIL AREA.
8. AT ALL STREAM CROSSINGS, RUNOFF MUST BE DIRECTED TO A SEDIMENT REMOVAL AREA (I.E. COMPOST FILTER SOCKS).
9. THE RIGHTS-OF-WAYS AND EASEMENTS SHOWN ON THIS PLAN ARE THE RESPONSIBILITY OF SUNOCO PIPELINE L.P. TO SECURE WITH THE INDIVIDUAL PROPERTY OWNER. THE RIGHTS-OF-WAY AND EASEMENTS SHOWN ON THIS PERMIT DRAWING REPRESENT THE BEST AVAILABLE PROPERTY INFORMATION AS PROVIDED TO TETRA TECH, INC. BY SUNOCO PIPELINE L.P. THE RIGHTS-OF-WAY AND EASEMENTS SHALL BE VERIFIED AND LOCATED IN THE FIELD BY SUNOCO PIPELINE L.P.
10. PAST AND PRESENT LAND USE CONSISTS OF AGRICULTURAL, FORESTED AND RESIDENTIAL AREAS. POST CONSTRUCTION LAND USE WILL BE A MAINTAINED, VEGETATED RIGHT-OF-WAY.
11. DRAWINGS REPRESENT THE FINAL PLAN FOR CONSTRUCTION.
12. THE EROSION & SEDIMENT CONTROL PLAN AND SITE RESTORATION PLAN, INSPECTION REPORTS, AND MONITORING REPORTS MUST BE AVAILABLE AT THE PROJECT SITE FOR REVIEW AND INSPECTION BY THE DEPARTMENT OR CONSERVATION DISTRICT.

SITE RESTORATION SCHEDULE:

1. AGRICULTURAL LIME APPLICATION RATES WILL BE DETERMINED BY FIELD PH TESTING. TESTING WILL BE PERFORMED AT A RATE OF 1 TEST/ACRE (MIN). IN ABSENCE OF FIELD TESTING, APPLY AT 6 TONS/ACRE.
2. APPLY 10-20-20 FERTILIZER AT THE RATE OF 1,000 LB/ACRE, OR AT A RATE DETERMINED BY FIELD TESTING.
3. WORK IN LIME AND FERTILIZER TO A DEPTH OF 4 IN. USING SUITABLE EQUIPMENT.
4. SEED PER PERMANENT SEED MIXTURE.
5. STRAW MULCH SHALL BE APPLIED AT THE RATE OF THREE TONS PER ACRE. CHEMICALLY TREATED OR SALTED STRAW IS NOT ACCEPTABLE AS MULCH.

SITE RESTORATION:

FOLLOWING COMPLETION OF PIPELINE INSTALLATION AND TRENCH BACKFILLING, THE AREA SHALL BE RETURNED TO GENERAL PRECONSTRUCTION GRADES PRESENT PRIOR TO PIPELINE INSTALLATION IN ORDER TO MAINTAIN PRECONSTRUCTION DRAINAGE PATTERNS. GROUNDS DISTURBED BY ANY OF THE OPERATIONS NECESSARY TO COMPLETE THE WORK FOR THIS PROJECT ARE TO BE PERMANENTLY SEEDED, OR IF SPECIFIED, SODDED, UNLESS OCCUPIED BY STRUCTURES, PAVED, OR DESIGNATED AS A PERMANENT ACCESS ROAD. THE ENTIRE RIGHT-OF-WAY WILL BE RESTORED BACK TO A MEADOW CONDITION OR LAWN IN ACCORDANCE WITH THE PERMANENT REVEGETATION PLAN ON ES-0.04. A TEMPORARY CESSATION OF EARTH DISTURBANCE ACTIVITIES THAT LASTS FOUR DAYS OR LONGER REQUIRES TEMPORARY STABILIZATION. DISTURBED AREAS, WHICH ARE AT FINAL GRADE, SHALL BE SEEDED AND MULCHED IMMEDIATELY, WITH THE EXCEPTION OF THE PERMANENT ACCESS ROADS. IF SEEDING CANNOT BE COMPLETED IMMEDIATELY AFTER THE AREA REACHES FINAL GRADE DUE TO WEATHER CONDITIONS, THE DISTURBED AREA SHALL BE STABILIZED AND MULCHED WITH STRAW AT THE RATE OF THREE TONS PER ACRE. THIS STRAW SHALL BE ANCHORED USING A METHOD DESCRIBED UNDER MULCHING OF THIS NARRATIVE. TEMPORARY ACCESS ROADS WILL BE RESTORED TO A VEGETATED CONDITION FOLLOWING CONSTRUCTION. THE PROPOSED PERMANENT ACCESS ROADS WILL REMAIN IN PLACE FOLLOWING CONSTRUCTION.

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SHEET 19
SHEET 19 OF 22

NOTES:

1. TOPOGRAPHIC MAPPING AND FEATURES COMPILED FROM WWW.PASDA.PSU.EDU.
2. THE PROJECT TAKES PLACE WITHIN PENNSYLVANIA.
3. TOWNSHIP BOUNDARIES TAKEN FROM WWW.PASDA.PSU.EDU.
4. 100-YEAR FEMA FLOODPLAINS FROM WWW.PASDA.PSU.EDU.
5. PIPELINE LOCATION AND RIGHT-OF-WAY FROM SUNOCO PIPELINE L.P.
6. USE COMPOST FILTER SOCK AS REQUIRED TO PREVENT RUNOFF FROM SPOIL AREA.
7. AT ALL STREAM CROSSINGS, RUNOFF MUST BE DIRECTED TO A SEDIMENT REMOVAL AREA (I.E. COMPOST FILTER SOCKS).
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9. PAST AND PRESENT LAND USE CONSISTS OF AGRICULTURAL, FORESTED AND RESIDENTIAL AREAS. POST CONSTRUCTION LAND USE WILL BE A MAINTAINED, VEGETATED RIGHT-OF-WAY.
10. DRAWINGS REPRESENT THE FINAL PLAN FOR CONSTRUCTION.
11. THE EROSION & SEDIMENT CONTROL PLAN AND SITE RESTORATION PLAN, INSPECTION REPORTS, AND MONITORING REPORTS MUST BE AVAILABLE FOR REVIEW AND INSPECTION BY THE DEPARTMENT OR CONSERVATION DISTRICT.
12. THE LICENSED PROFESSIONAL OR DESIGNEE SHALL BE PRESENT ON SITE FOR THE CONSTRUCTION OF THE INFILTRATION BERMS AND TRENCHES.
13. A RECORDED INSTRUMENT WILL BE RECORDED AT THE RECORDER OF DEEDS TO PROVIDE FOR NECESSARY ACCESS FOR LONG TERM OPERATION AND MAINTENANCE FOR PCSM BMP'S. THE DEED WILL PROVIDE NOTICE THAT THE RESPONSIBILITY FOR THE LONG TERM OPERATION AND MAINTENANCE OF THE PCSM BMP'S IS A COVENANT THAT RUNS WITH THE LAND AND IS BINDING AND ENFORCEABLE BY SUBSEQUENT GRANTEES..

SITE RESTORATION

FOLLOWING COMPLETION OF PIPELINE INSTALLATION AND TRENCH BACKFILLING, THE PIPELINE RIGHT OF WAY, ASSOCIATED WORKSPACES, AND TEMPORARY ACCESS ROADS SHALL BE RETURNED TO THE GENERAL GRADE PRESENT PRIOR TO PIPELINE INSTALLATION IN ORDER TO MAINTAIN PRECONSTRUCTION DRAINAGE PATTERNS. AFTER COMPLETION OF MAJOR CONSTRUCTION WORK, TOPSOIL THAT WAS STOCKPILED DURING CONSTRUCTION WILL BE PLACED ALONG THE ROW. GROUNDS DISTURBED BY ANY OF THE OPERATIONS NECESSARY TO COMPLETE THE WORK FOR THIS PROJECT ARE TO BE PERMANENTLY SEEDED, OR IF SPECIFIED, SODDED, UNLESS OCCUPIED BY STRUCTURES, PAVED OR DESIGNATED AS A PERMANENT ACCESS ROAD. DISTURBED AREAS, WHICH ARE AT FINAL GRADE, SHALL BE SEEDED AND MULCHED ONCE FINAL GRADES ARE ACHIEVED. THE PERMANENT SEED MIXTURE WILL RESTORE DISTURBED AREAS TO A MEADOW IN GOOD CONDITION OR BETTER. IF SEEDING CANNOT BE COMPLETED WITHIN A FOUR (4) DAY PERIOD DUE TO WEATHER CONDITIONS, THE DISTURBED AREA WILL BE MULCHED WITH STRAW AT THE RATE OF THREE (3) TONS PER ACRE. THIS STRAW WILL BE ANCHORED USING A METHOD OUTLINED ON DRAWING PCS-0.03.

SITE RESTORATION CONSTRUCTION SEQUENCE

A GENERALIZED CONSTRUCTION SEQUENCE IS PROVIDED BELOW. THE CONSTRUCTION SEQUENCE IS INTENDED TO PROVIDE A GENERAL COURSE OF ACTION TO CONFORM TO THE APPLICABLE REGULATORY AGENCY REQUIREMENTS FOR SITE RESTORATION AND POST-CONSTRUCTION STORMWATER MANAGEMENT OF THE SITE. NECESSARY STEPS FOR PROPER AND COMPLETE EXECUTION OF WORK PERTAINING TO THIS PLAN, WHETHER SPECIFICALLY MENTIONED OR NOT, ARE TO BE PERFORMED BY THE CONTRACTOR. THE CONTRACTOR WILL COMPLY WITH ALL REQUIREMENTS LISTED IN THIS SECTION. THE CONTRACTOR MAY BE REQUIRED TO ALTER CONTROLS BASED ON THE EFFECTIVENESS OF CONTROLS OR DIFFERING CONDITIONS ENCOUNTERED IN THE FIELD. THE APPROPRIATE COUNTY CONSERVATION DISTRICT AND DEP SHALL BE CONTACTED AND MUST APPROVE ANY DEVIATION TO THE AUTHORIZED PLANS.
A PRE-CONSTRUCTION MEETING IS REQUIRED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY. THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (PADEP) OR APPLICABLE COUNTY CONSERVATION DISTRICT, CONTRACTORS, THE LANDOWNER, APPROPRIATE MUNICIPAL OFFICIALS, AND THE PLAN PREPARER MUST BE INVITED TO THIS MEETING AT LEAST 7 DAYS IN ADVANCE.

1. GRADE SURFACE TO FINISHED GRADE ELEVATIONS AS SOON AS PRACTICABLE FOLLOWING COMPLETION OF PIPE INSTALLATION.
2. SURFACE ROUGHENING WILL BE UTILIZED TO ROUGH THE SOIL SURFACE WITH HORIZONTAL DEPRESSIONS FOR THE PURPOSE OF REDUCING RUNOFF VELOCITY, INCREASING INFILTRATION, AIDING THE ESTABLISHMENT OF VEGETATION, AND REDUCING EROSION. SURFACE ROUGHENING SHOULD BE APPLIED TO SLOPES 3H:1V OR STEEPER UNLESS A STABLE ROCK FACE IS PROVIDED OR IT CAN BE SHOWN THAT THERE IS NOT A POTENTIAL FOR SEDIMENT POLLUTION TO SURFACE WATERS. FOR ROUGHENED SURFACES WITHIN 50 FEET OF A SURFACE WATER, AND WHERE BLANKETING OF SEEDED AREAS IS PROPOSED AS THE MEANS TO ACHIEVING PERMANENT STABILIZATION, SPRAY-ON TYPE BLANKETS ARE RECOMMENDED. SURFACE ROUGHENING SHALL BE ACCOMPLISHED USING DOZERS AFFIXED WITH GROUSER TRACKED EQUIPMENT. DOZERS SHALL RUN UP AND DOWN THE SLOPES LEAVING HORIZONTAL GROOVES PERPENDICULAR TO THE SLOPE. DOZER BLADES SHALL BE RAISED AND NOT USED DURING SURFACE ROUGHENING. WHERE COMPACTION DOES OCCUR, CONTRACTOR SHALL SCARIFIY THE SOIL OR PROVIDE ADDITIONAL ROUGHENING SUCH AS DEEP RIPPING OR CHISEL RIPPING TO RESTORE THE AREA TO A MINIMAL COMPACTED STATE. IN AREAS OF PROPOSED INFILTRATION, SOILS SHALL BE AMENDED TO 2' BELOW GRADE. SEE SOIL AMENDMENT AND RESTORATION CONSTRUCTION SEQUENCE BELOW.
3. PLACE TOPSOIL FROM TOPSOIL STOCKPILES AS THE UPPER LAYER OF BACKFILL. TOPSOIL SHALL NOT BE PLACED WHEN THE SUBGRADE IS FROZEN OR WHEN IT IS EXCESSIVELY WET OR DRY AND SHALL NOT BE HANDLED WHEN IN A FROZEN OR MUDDY CONDITION.
4. REMOVE GRAVEL AND GEOTEXTILE FROM THE TEMPORARY ACCESS ROADS AND SCARIFY THE SOIL. REFER TO STEP 2 OF THIS SEQUENCE TO ADDRESS COMPACTION AT ACCESS ROADS. AFTER ADDRESSING COMPACTION CONCERNS, PLACE TOPSOIL THAT WAS STRIPPED PRIOR TO INSTALLATION OF THE ACCESS ROADS.
5. IMMEDIATELY SEED AND MULCH DISTURBED AREAS IN ACCORDANCE WITH THE PERMANENT SEEDING SCHEDULE ONCE FINAL GRADE IS ESTABLISHED AND TOPSOIL IS PLACED.
6. MAINTAIN EROSION AND SEDIMENTATION CONTROL DEVICES UNTIL SITE WORK IS COMPLETE AND A UNIFORM 70-PERCENT PERENNIAL VEGETATIVE COVER IS ESTABLISHED. REGRADE AND REVEGETATE AREAS DISTURBED DURING THE REMOVAL OF THE EROSION AND SEDIMENT CONTROLS.

GEOWEB CONSTRUCTION SEQUENCE

1. GRADE SURFACE TO SUBGRADE ELEVATIONS AS SOON AS PRACTICABLE FOLLOWING COMPLETION OF PIPE INSTALLATION. DO NOT COMPACT.
2. IF NEEDED, SCARIFY THE SOIL OR PROVIDE ADDITIONAL ROUGHENING SUCH AS DEEP RIPPING OR CHISEL RIPPING TO RESTORE THE AREA TO A MINIMAL COMPACTED STATE.
3. INSTALL GEOTEXTILE SEPARATION LAYER IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
4. EXPAND GEOWEB TO REQUIRED DIMENSIONS AND ANCHOR EDGES WITH ATRA ANCHORS, IF NEEDED. JOIN ADJACENT SECTIONS WITH ATRA KEYS.
5. ANCHOR GEOWEB ON SLOPES GREATER THAT 5% WITH 24" ATRA ANCHORS PLACED ON A 3X8 CELL PATTERN.
6. MIX AND PLACE ENGINEERED INFILL MATERIAL (2/3 AASHTO #57 STONE AND 1/3 SCREENED TOPSOIL) INTO THE GEOWEB CELLS. INFILL MATERIAL SHALL BE FREE-FLOWING AND NOT FROZEN WHEN PLACED IN THE GEOWEB SECTIONS. LIMIT DROP HEIGHT TO 3 FEET TO AVOID DAMAGING OR DISPLACEMENT OF THE CELL WALL. SLIGHTLY OVERFILL THE CELLS AND LEVEL OFF MATERIAL ONCE SETTLEMENT IS NEGLIGIBLE. DO NOT COMPACT.
7. SEED AND MULCH FILLED SECTIONS IN ACCORDANCE WITH THE PERMANENT SEEDING SCHEDULE ONCE INFILL IS PLACED.
8. MAINTAIN EROSION AND SEDIMENTATION CONTROL DEVICES UNTIL SITE WORK IS COMPLETE AND A UNIFORM 70-PERCENT PERENNIAL VEGETATIVE COVER IS ESTABLISHED.

SOIL AMENDMENT AND RESTORATION CONSTRUCTION SEQUENCE

1. GRADE SURFACE TO FINISHED GRADE ELEVATIONS AS SOON AS PRACTICABLE FOLLOWING COMPLETION OF PIPE INSTALLATION.
2. IN THE DESIGNATED SOIL AMENDMENT AREA, TILL THE GROUND AND MIX IN THE COMPOST AT A RATIO OF 2:1 (SOIL:COMPOST) TO A DEPTH OF 24 INCHES.
3. IMMEDIATELY SEED AND MULCH DISTURBED AREAS ONCE FINAL GRADE IS ESTABLISHED IN ACCORDANCE WITH THE PERMANENT SEEDING SCHEDULE.
4. MAINTAIN EROSION AND SEDIMENTATION CONTROL DEVICES UNTIL SITE WORK IS COMPLETE AND A UNIFORM 70% PERENNIAL VEGETATIVE COVER IS ESTABLISHED.

POST CONSTRUCTION STORMWATER MANAGEMENT CONSTRUCTION SEQUENCE

1. GRADE SURFACE TO FINISHED GRADE ELEVATIONS AS SOON AS PRACTICABLE FOLLOWING COMPLETION OF PIPE INSTALLATION.
2. INSTALL POST CONSTRUCTION BMPS AFTER COMPLETION OF PIPELINE CONSTRUCTION:

SOIL AMENDMENT AND RESTORATION

1. GRADE SURFACE TO FINISHED GRADE ELEVATIONS AS SOON AS PRACTICABLE FOLLOWING COMPLETION OF PIPE INSTALLATION.
2. IN THE DESIGNATED SOIL AMENDMENT AREA, TILL THE GROUND AND MIX IN THE COMPOST AT A RATIO OF 2:1 (SOIL:COMPOST) TO A DEPTH OF 24 INCHES.
3. IMMEDIATELY SEED AND MULCH DISTURBED AREAS ONCE FINAL GRADE IS ESTABLISHED IN ACCORDANCE WITH THE PERMANENT SEEDING SCHEDULE.
4. MAINTAIN EROSION AND SEDIMENTATION CONTROL DEVICES UNTIL SITE WORK IS COMPLETE AND A UNIFORM 70% PERENNIAL VEGETATIVE COVER IS ESTABLISHED.

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REVISIONS

NO.	BY	DATE	REMARKS

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

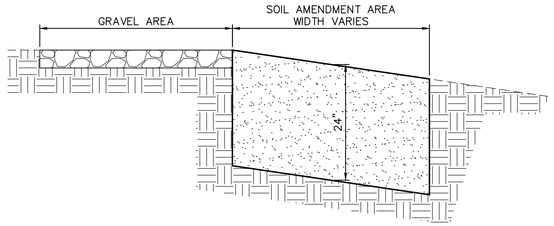
PENNSYLVANIA PIPELINE PROJECT

1-20" PROPOSED WELDED STEEL NATURAL GAS LIQUIDS PIPELINE

EROSION & SEDIMENT CONTROL &
SITE RESTORATION PLAN
NOTES & DETAILS

DATE:	NOVEMBER 2016
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

SHEET 20
SHEET 20 OF 22



NOTES:

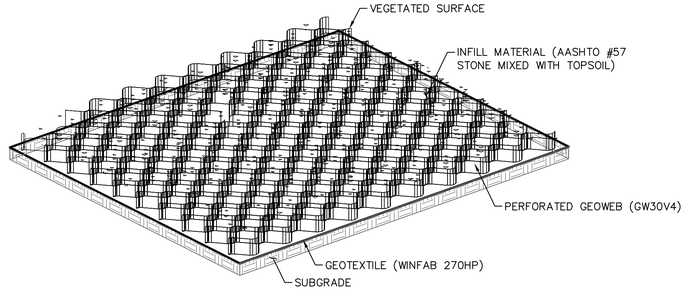
1. SOIL AMENDMENT MEDIA SHOULD CONSIST OF SOIL AND COMPOST AT A RATIO OF 2:1 (SOIL:COMPOST).
2. SOIL AMENDMENT SHOULD NOT BE USED ON SLOPES GREATER THAN 30%.
3. COMPOST CAN BE SUBSTITUTED WITH MULCH, MANURE, SAND.
4. NO VEHICULAR TRAFFIC WILL BE PERMITTED TO DRIVE IN UNPROTECTED SOIL AMENDMENT AREAS TO MINIMIZE THE POSSIBILITY OF COMPACTION
5. ALL CONSTRUCTION SHOULD BE COMPLETED AND STABILIZED BEFORE BEGINNING SOIL RESTORATION.
6. SOIL AMENDMENT TO BE INSTALLED BY TILLING.

SOIL AMENDMENT DETAIL
NOT TO SCALE

CHANNEL CROSS-SECTION

CHANNEL NO.	BOTTOM WIDTH B (FT)	DEPTH D (FT)	Z1 (FT)	Z2 (FT)	LINING*
A	4.0	2.0	2	2	NAG S150 ECB WITH CLASS C FINAL STABILIZATION
B	4.0	2.0	2	2	NAG P300 ECB WITH CLASS C FINAL STABILIZATION
C	4.0	2.0	2	2	NAG S150 ECB WITH CLASS C FINAL STABILIZATION
D	4.0	2.0	2	2	NAG S150 ECB WITH CLASS C FINAL STABILIZATION
E	6.0	2.0	2	2	NAG P300 ECB WITH CLASS C FINAL STABILIZATION
F	4.0	2.0	2	2	NAG S150 ECB WITH CLASS C FINAL STABILIZATION
G	2.0	2.0	2	2	NAG S150 ECB WITH CLASS C FINAL STABILIZATION

PERMANENT CHANNEL DETAIL
NOT TO SCALE



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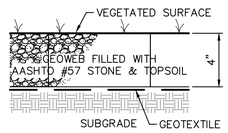
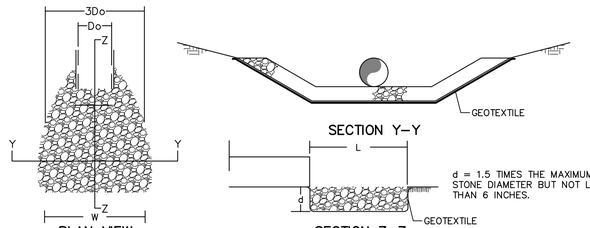


SECTION

NOTES:

1. PREPARE THE SUBGRADE AS SHOWN ON THE CONSTRUCTION DRAWINGS.
2. DO NOT COMPACT SUBGRADE.
3. PROVIDE WOVEN HIGH STRENGTH STABILIZATION GEOTEXTILE (WINFAB 270HP).
4. EXPAND THE GEOWEB SECTIONS INTO POSITION AND CONNECT THE END TO END AND INTERLEAF CONNECTIONS WITH ATRA KEYS.
5. GEOWEB CELL INFILL MATERIAL SHALL BE A MIX OF AASHTO #57 STONE AND SCREENED TOPSOIL IN AN APPROXIMATE RATIO OF 2/3 #57 AND 1/3 TOPSOIL.
6. PLACE THE SPECIFIED INFILL MATERIAL INTO CELLS AND TRACK UNTIL CELL IS FILLED AND SETTLEMENT OF INFILL IS NEGLIBILE.
7. ROUGH GRADE CONTOURS DEPICT THE TOP OF SUBGRADE IN AREAS WHERE GEOWEB IS TO BE INSTALLED.
8. TOP OF GEOWEB IS AT ELEVATION 4 INCHES ABOVE ROUGH GRADE SHOWN ON GRADING PLAN.
9. ON SLOPES GREATER THAN 5%, ANCHOR GEOWEB WITH 24" ATRA ANCHORS IN A 3x8 CELL PATTERN.

BLOCK VALVE GEOWEB DETAIL
NOT TO SCALE



PLAN VIEW

SECTION Y-Y

SECTION Z-Z

OUTLET NO.	PIPE DIA Do (FT)	Q (CFS)	MINIMUM RIPRAP SIZE	MINIMUM L (FT)	MINIMUM W (FT)
RA-01	4.0	6.66	R-3	12.0	16.0
RA-02	4.0	19.77	R-3	14.0	18.0
RA-03	2.0	7.76	R-3	10.0	13.0
RA-04	2.0	48.43	R-5	26.0	32.0
RA-05	1.5	9.99	R-3	10.0	13.0
RA-06	1.5	10.34	R-3	10.0	13.0

RIPRAP APRONS AT PIPE OUTLETS WITH FLARED END SECTIONS
NOT TO SCALE

PCSM DETAILS

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REVISIONS			
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SUNOCO PIPELINE L.P.
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PENNSYLVANIA PIPELINE PROJECT

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DATE:	NOVEMBER 2016
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SHEET 22 OF 22

APPENDIX C

RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS

Restrictive Layer and Fragipan Analysis Methodology

This restrictive layer and fragipan analysis table details the compilation of mapped soil unit and field verified soil characteristic data including: the NRCS mapped soil unit present at each wetland and whether that soil unit contained a likelihood to possess fragipan wetlands, a Wetland Functions and Values Assessment for each wetland and whether the rationale for fragipan wetland characteristics was utilized, the soil profile examination depth, the composition of the restrictive layer and depth (if present), composition of refusal layer and depth (if present), and a description of the soil profile.

When evaluating whether a restrictive layer, and/or refusal within the soil profile, was indicative of a fragipan scenario, first an examination of available soil profile data provided in the Wetland Determination Data Forms was performed for each wetland at which impacts are anticipated. During this examination, information regarding the type and depth of restrictive or refusal layers, the NRCS Mapped soil unit and examination depth were extracted from data forms and compiled in the table. For all wetlands anticipated to be impacted by the Pennsylvania Pipeline Project (Project) that exhibited either a restrictive layer and/or refusal within the soil profile, a soil profile description was provided. The description of the soil profile included depths and thicknesses of examined soil textures.

The examination depth is the maximum depth to which the soil profile was examined during wetland delineation investigations. All mapped soil units present at wetlands intersected by the proposed Project were queried for the likelihood to possess fragipan soil characteristics. NRCS mapped soil units that indicated inclusions of fragipan soil characteristics, as evaluated in the Soil Survey Geographic (SSURGO) Database [in a field labeled "featurekind"], were utilized to query out wetlands that existed within soils known to contain fragipan situations. Soil profile descriptions were also provided for all of the wetlands that were identified as such, regardless of whether they exhibited a restrictive layer and/or refusal in the soil profile. The distinction between a restrictive layer and refusal in the soil profile is important in identifying whether a fragipan scenario is present within a wetland.

A restrictive layer is a layer in the soil/substratum profile that could slow or prevent the infiltration of water, potentially resulting in a perched water table. Restrictive layers could include, but are not limited to, consolidated bedrock, fragipans, dense glacial till, layers of silt or substantial clay content, strongly contrasting soil textures (e.g., silt over sand), or cemented layers, such as ortstein. Whereas, refusal is the depth at which a layer inhibiting the ability to dig deeper was reached. Refusal is not always indicative of a hydrologically restrictive layer (e.g. high gravel/cobble content, dense tree roots). Furthermore, if there is refusal at a layer of coarse fragments of rock, it would seem unlikely that that substratum would be impermeable. A refusal layer may still be permeable; whereas, a restrictive layer is impermeable by definition.

In addition to the examination of data extracted from Wetland Determination Data Forms, information regarding the presence of fragipan wetlands was collected from available Wetland Functions and Values Assessments conducted at each wetland intersected by the Project. If Rationale #6 "fragipan, impervious soils, or bedrock does occur in this wetland" was utilized to justify the Groundwater Recharge/Discharge Principal Function/Value at a wetland it was noted on the provided table. This rationale directly

references the presence of a restrictive layer, but soil profile data was not always supportive of this rationale. At some wetlands the soil depth examined was not deep enough to exhibit a restrictive layer, but the spatial and topographical location of the wetland were enough to extrapolate that a restrictive layer must be present (e.g. – wetlands present on tops of ridges or plateaus where only localized topography and a restrictive layer sustain hydrology).

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
A20A	PEM	Washington	Pittsburgh	Southwest	N	UkF	N	N/A	N/A	N/A	N/A	N/A	N/A
SZ1	PEM	Washington	Pittsburgh	Southwest	N	DtD	N	N/A	N/A	N/A	N/A	N/A	N/A
SZ2	PEM	Washington	Pittsburgh	Southwest	N	DtD	N	N/A	N/A	N/A	N/A	N/A	N/A
T2	PEM	Washington	Pittsburgh	Southwest	N	DoC	N	N/A	N/A	N/A	N/A	N/A	N/A
T27	PEM	Washington	Pittsburgh	Southwest	N	Fa	N	N/A	N/A	N/A	N/A	N/A	N/A
T28	PEM	Washington	Pittsburgh	Southwest	N	DoC	N	N/A	N/A	N/A	N/A	N/A	N/A
W12	PEM	Washington	Pittsburgh	Southwest	N	DoC	N	N/A	N/A	N/A	N/A	N/A	N/A
W14	PEM	Washington	Pittsburgh	Southwest	N	DoD	N	N/A	N/A	N/A	N/A	N/A	N/A
W37	PEM	Washington	Pittsburgh	Southwest	N	DoD	N	N/A	N/A	N/A	N/A	N/A	N/A
W42	PEM	Washington	Pittsburgh	Southwest	N	UkF	N	6	Y	Y	6	Bedrock	0-6" Silt loam
W43	PEM	Washington	Pittsburgh	Southwest	N	DoC	N	N/A	N/A	N/A	N/A	N/A	N/A
W44	PEM	Washington	Pittsburgh	Southwest	N	DoC	N	N/A	N/A	N/A	N/A	N/A	N/A
W5	PEM	Washington	Pittsburgh	Southwest	N	DoD	N	N/A	N/A	N/A	N/A	N/A	N/A
W8	PEM	Washington	Pittsburgh	Southwest	N	Fa	N	N/A	N/A	N/A	N/A	N/A	N/A
W9	PEM	Washington	Pittsburgh	Southwest	N	DtF	N	N/A	N/A	N/A	N/A	N/A	N/A
T1	PEM (1, 2)	Washington	Pittsburgh	Southwest	N	Nw	Y	16	N	N/A	N/A	N/A	0-16" Clay
T1	PEM (3)	Washington	Pittsburgh	Southwest	N	UkF	Y	16	N	N/A	N/A	N/A	0-2" Silty clay loam; 2-16" Clay
W13	PEM	Washington	Pittsburgh	Southwest	N	Nw	Y	14	N	N/A	N/A	N/A	0-4" Sandy loam; 4-14" Sandy loam
W204	PEM	Washington	Pittsburgh	Southwest	N	CaC	N	N/A	N/A	N/A	N/A	N/A	N/A
46-1	PEM	Allegheny	Pittsburgh	Southwest	N	GsF	N	N/A	N/A	N/A	N/A	N/A	N/A
W38	PEM	Allegheny	Pittsburgh	Southwest	N	RAB	N	N/A	N/A	N/A	N/A	N/A	N/A
W62	PEM	Allegheny	Pittsburgh	Southwest	N	SmF	N	N/A	N/A	N/A	N/A	N/A	N/A
W63	PEM	Allegheny	Pittsburgh	Southwest	N	RaB	N	N/A	N/A	N/A	N/A	N/A	N/A
CS3	PEM	Westmoreland	Pittsburgh	Southwest	N	Ln	N	N/A	N/A	N/A	N/A	N/A	N/A
SZ7	PEM	Westmoreland	Pittsburgh	Southwest	N	FaD	N	N/A	N/A	N/A	N/A	N/A	N/A
BB79	PEM	Westmoreland	Pittsburgh	Southwest	N	WrB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB80	PEM/PSS	Westmoreland	Pittsburgh	Southwest	N	Lo	N	N/A	N/A	N/A	N/A	N/A	N/A
CS1	PEM	Westmoreland	Pittsburgh	Southwest	N	MoC	Y	12	N	N/A	N/A	N/A	0-12" Clay loam
M67	PEM	Westmoreland	Pittsburgh	Southwest	N	WrC	N	N/A	N/A	N/A	N/A	N/A	N/A
M69	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
M71	PEM/PSS	Westmoreland	Pittsburgh	Southwest	N	GuC	N	N/A	N/A	N/A	N/A	N/A	N/A
M72	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
M73	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
M74	PFO	Westmoreland	Pittsburgh	Southwest	N	Lo	N	N/A	N/A	N/A	N/A	N/A	N/A
M75	PEM/PFO	Westmoreland	Pittsburgh	Southwest	N	Lo	N	N/A	N/A	N/A	N/A	N/A	N/A
M76	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
M77	PEM	Westmoreland	Pittsburgh	Southwest	N	WrC	N	N/A	N/A	N/A	N/A	N/A	N/A
M78	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
N28	PEM	Westmoreland	Pittsburgh	Southwest	N	Lo	Y	12	N	N/A	N/A	N/A	0-12" Sandy silt loam
N28	PFO	Westmoreland	Pittsburgh	Southwest	N	Lo	Y	12	N	N/A	N/A	N/A	0-12" Sandy silt loam
N72	PEM	Westmoreland	Pittsburgh	Southwest	N	ErC	N	N/A	N/A	N/A	N/A	N/A	N/A
N76	PEM	Westmoreland	Pittsburgh	Southwest	N	GcD	N	N/A	N/A	N/A	N/A	N/A	N/A
N78	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
N79	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
N80	PEM	Westmoreland	Pittsburgh	Southwest	N	ShF	N	N/A	N/A	N/A	N/A	N/A	N/A
N81	PEM	Westmoreland	Pittsburgh	Southwest	N	GwF	N	N/A	N/A	N/A	N/A	N/A	N/A
N82	PEM/PSS	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
O45	PEM/PFO	Westmoreland	Pittsburgh	Southwest	N	Lo	N	N/A	N/A	N/A	N/A	N/A	N/A
P13	PEM	Westmoreland	Pittsburgh	Southwest	N	ErC	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Gravelly clay loam
P14	PEM	Westmoreland	Pittsburgh	Southwest	N	ErC	N	N/A	N/A	N/A	N/A	N/A	N/A
P15	PEM/PFO	Westmoreland	Pittsburgh	Southwest	N	ErC	N	N/A	N/A	N/A	N/A	N/A	N/A
P16	PEM	Westmoreland	Pittsburgh	Southwest	N	GcC	N	N/A	N/A	N/A	N/A	N/A	N/A
P17	PEM	Westmoreland	Pittsburgh	Southwest	N	WrD	N	N/A	N/A	N/A	N/A	N/A	N/A
P18	PEM	Westmoreland	Pittsburgh	Southwest	N	Lo/ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
P20	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
P22	PEM	Westmoreland	Pittsburgh	Southwest	N	Lo	N	N/A	N/A	N/A	N/A	N/A	N/A
P23	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Gravelly clay loam
P25	PEM/PFO	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
P26	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB/Lo	N	N/A	N/A	N/A	N/A	N/A	N/A
P27	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB/Lo	N	N/A	N/A	N/A	N/A	N/A	N/A
P28	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB/Ho	N	N/A	N/A	N/A	N/A	N/A	N/A
P29	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB/Ho	N	N/A	N/A	N/A	N/A	N/A	N/A
P30	PEM	Westmoreland	Pittsburgh	Southwest	N	Ho	N	N/A	N/A	N/A	N/A	N/A	N/A
P33	PEM/PFO	Westmoreland	Pittsburgh	Southwest	N	Ho	N	N/A	N/A	N/A	N/A	N/A	N/A
P34	PEM	Westmoreland	Pittsburgh	Southwest	N	Ho	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Clay loam
P35	PEM	Westmoreland	Pittsburgh	Southwest	N	ErC	N	N/A	N/A	N/A	N/A	N/A	N/A
P5	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
P7	PEM	Westmoreland	Pittsburgh	Southwest	N	VaC	N	N/A	N/A	N/A	N/A	N/A	N/A
Q4	PEM	Westmoreland	Pittsburgh	Southwest	N	GcD	N	N/A	N/A	N/A	N/A	N/A	N/A
Q6	PEM/PFO	Westmoreland	Pittsburgh	Southwest	N	ShF	N	N/A	N/A	N/A	N/A	N/A	N/A
Q7	PEM	Westmoreland	Pittsburgh	Southwest	N	Ho	N	N/A	N/A	N/A	N/A	N/A	N/A
Q70	PFO/PEM	Westmoreland	Pittsburgh	Southwest	N	WeA/GxA	N	N/A	N/A	N/A	N/A	N/A	N/A
Q74	PFO	Westmoreland	Pittsburgh	Southwest	N	GcB	N	N/A	N/A	N/A	N/A	N/A	N/A
Q8	PSS	Westmoreland	Pittsburgh	Southwest	N	Ho	N	N/A	N/A	N/A	N/A	N/A	N/A
Q92	PEM/PSS	Westmoreland	Pittsburgh	Southwest	N	WeA	N	N/A	N/A	N/A	N/A	N/A	N/A
R43	PEM	Westmoreland	Pittsburgh	Southwest	N	WrB	N	N/A	N/A	N/A	N/A	N/A	N/A
SZ6	PEM	Westmoreland	Pittsburgh	Southwest	N	MoB	Y	12	N	N/A	-	-	0-2" Muck; 2-12" Silty clay
W48	PEM	Westmoreland	Pittsburgh	Southwest	N	ReB	Y	14	N	N/A	-	-	0-16" Silt loam
W49	PEM	Westmoreland	Pittsburgh	Southwest	N	ClB	Y	14	N	N/A	-	-	0-4; Silt loam 4-14" Clay loam
W52	PEM	Westmoreland	Pittsburgh	Southwest	N	BeD	N	N/A	N/A	N/A	N/A	N/A	N/A
W53	PEM	Westmoreland	Pittsburgh	Southwest	N	Lo	N	N/A	N/A	N/A	N/A	N/A	N/A
W54	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
W56	PEM	Westmoreland	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
W57	PEM	Westmoreland	Pittsburgh	Southwest	N	FaC	N	6	Y	Y	6	Bedrock	0-6" Silt loam
W58	PEM	Westmoreland	Pittsburgh	Southwest	N	FaC	N	N/A	N/A	N/A	N/A	N/A	N/A
W60	PEM	Westmoreland	Pittsburgh	Southwest	N	ClB	N	N/A	N/A	N/A	N/A	N/A	N/A
W60	PEM	Westmoreland	Pittsburgh	Southwest	N	ClB	Y	12	N	N/A	-	-	0-12" Silt loam
W61	PSS	Westmoreland	Pittsburgh	Southwest	N	FaB	N	N/A	N/A	N/A	N/A	N/A	N/A
W64	PEM	Westmoreland	Pittsburgh	Southwest	N	FaD	N	N/A	N/A	N/A	N/A	N/A	N/A
W65	PEM	Westmoreland	Pittsburgh	Southwest	N	FaD	N	N/A	N/A	N/A	N/A	N/A	N/A
W68	PEM	Westmoreland	Pittsburgh	Southwest	N	Ln	N	N/A	N/A	N/A	N/A	N/A	N/A
W69	PEM	Westmoreland	Pittsburgh	Southwest	N	Ln	N	N/A	N/A	N/A	N/A	N/A	N/A
W70	PEM	Westmoreland	Pittsburgh	Southwest	N	Mn	N	N/A	N/A	N/A	N/A	N/A	N/A
W71	PEM	Westmoreland	Pittsburgh	Southwest	N	ClB	N	N/A	N/A	N/A	N/A	N/A	N/A
W71	PEM	Westmoreland	Pittsburgh	Southwest	N	ClB	Y	14	N	N/A	N/A	N/A	0-14" Silt Loam
CC30	PEM	Indiana	Pittsburgh	Southwest	N	ErB	N	12	Y	Y	12	Rock	0-12" Silty clay loam
J52	PEM	Indiana	Pittsburgh	Southwest	N	GwD	N	N/A	N/A	N/A	N/A	N/A	N/A
J53	PEM	Indiana	Pittsburgh	Southwest	N	TyB	N	N/A	N/A	N/A	N/A	N/A	N/A
N34	PEM, PFO	Indiana	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
N35	PSS	Indiana	Pittsburgh	Southwest	N	RnC	N	N/A	N/A	N/A	N/A	N/A	N/A
N37	PEM	Indiana	Pittsburgh	Southwest	N	SxF	N	N/A	N/A	N/A	N/A	N/A	N/A
N38	PEM, PSS	Indiana	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
N39	PEM	Indiana	Pittsburgh	Southwest	N	RnB	N	N/A	N/A	N/A	N/A	N/A	N/A
N41	PEM	Indiana	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
N43	PEM	Indiana	Pittsburgh	Southwest	N	ErC	N	N/A	N/A	N/A	N/A	N/A	N/A
N45	PEM	Indiana	Pittsburgh	Southwest	N	EsD	N	10	N	Y	10	Refusal-Coarse Fragments	0-10" Sandy silt loam
N47	PEM	Indiana	Pittsburgh	Southwest	N	EsD	N	N/A	N/A	N/A	N/A	N/A	N/A
N49	PEM	Indiana	Pittsburgh	Southwest	N	EsD	N	N/A	N/A	N/A	N/A	N/A	N/A
N50	PEM	Indiana	Pittsburgh	Southwest	N	EsD	N	N/A	N/A	N/A	N/A	N/A	N/A
N52	PEM	Indiana	Pittsburgh	Southwest	N	EsD	N	N/A	N/A	N/A	N/A	N/A	N/A
N53	PEM	Indiana	Pittsburgh	Southwest	N	GwF	N	N/A	N/A	N/A	N/A	N/A	N/A
N54	PEM	Indiana	Pittsburgh	Southwest	N	WhB	N	N/A	N/A	N/A	N/A	N/A	N/A
N55	PEM	Indiana	Pittsburgh	Southwest	N	WhB	N	N/A	N/A	N/A	N/A	N/A	N/A
N56	PEM	Indiana	Pittsburgh	Southwest	N	CaB	N	N/A	N/A	N/A	N/A	N/A	N/A
N57	PEM, PSS	Indiana	Pittsburgh	Southwest	N	CaB	N	N/A	N/A	N/A	N/A	N/A	N/A
N60	PEM	Indiana	Pittsburgh	Southwest	N	RnC	N	N/A	N/A	N/A	N/A	N/A	N/A

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
N61	PEM	Indiana	Pittsburgh	Southwest	N	BxB	N	N/A	N/A	N/A	N/A	N/A	N/A
N65	PEM	Indiana	Pittsburgh	Southwest	N	GcC	N	N/A	N/A	N/A	N/A	N/A	N/A
N69	PEM	Indiana	Pittsburgh	Southwest	N	MoB	N	N/A	N/A	N/A	N/A	N/A	N/A
N70	PEM	Indiana	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
N71	PEM	Indiana	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
O46	PFO	Indiana	Pittsburgh	Southwest	N	BuB	N	N/A	N/A	N/A	N/A	N/A	N/A
O48	PEM	Indiana	Pittsburgh	Southwest	N	BuB	N	N/A	N/A	N/A	N/A	N/A	N/A
O51	PEM	Indiana	Pittsburgh	Southwest	N	BuB	N	12	N	Y	12	Refusal-Coarse Fragments	0-12" Silt loam
O52	PEM	Indiana	Pittsburgh	Southwest	N	BxB	N	N/A	N/A	N/A	N/A	N/A	N/A
O54	PFO	Indiana	Pittsburgh	Southwest	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
O55	PEM	Indiana	Pittsburgh	Southwest	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
O56	PEM, PSS	Indiana	Pittsburgh	Southwest	N	CaB	N	N/A	N/A	N/A	N/A	N/A	N/A
O57	PEM	Indiana	Pittsburgh	Southwest	N	CaB	N	N/A	N/A	N/A	N/A	N/A	N/A
O58	PEM	Indiana	Pittsburgh	Southwest	N	BkB	N	N/A	N/A	N/A	N/A	N/A	N/A
O59	PEM	Indiana	Pittsburgh	Southwest	N	SxF	N	N/A	N/A	N/A	N/A	N/A	N/A
O63	PEM	Indiana	Pittsburgh	Southwest	N	ErC	N	N/A	N/A	N/A	N/A	N/A	N/A
O66	PEM	Indiana	Pittsburgh	Southwest	N	ErC	N	N/A	N/A	N/A	N/A	N/A	N/A
O68	PEM	Indiana	Pittsburgh	Southwest	N	HxB	N	N/A	N/A	N/A	N/A	N/A	N/A
O70	PEM, PFO	Indiana	Pittsburgh	Southwest	N	BxB	N	N/A	N/A	N/A	N/A	N/A	N/A
O72	PEM	Indiana	Pittsburgh	Southwest	N	CpD	N	N/A	N/A	N/A	N/A	N/A	N/A
O74	PEM	Indiana	Pittsburgh	Southwest	N	BxB	N	N/A	N/A	N/A	N/A	N/A	N/A
O77	PEM, PSS	Indiana	Pittsburgh	Southwest	N	Or	N	N/A	N/A	N/A	N/A	N/A	N/A
P1	PEM	Indiana	Pittsburgh	Southwest	N	GcA	N	N/A	N/A	N/A	N/A	N/A	N/A
P2	PEM	Indiana	Pittsburgh	Southwest	N	GcB	Y	10	N	Y	10	Refusal-coarse fragments	0-10" Gravelly clay loam
P2	PSS	Indiana	Pittsburgh	Southwest	N	GcB	Y	10	N	Y	10	Refusal-coarse fragments	0-10" Gravelly clay loam
W134	PEM	Indiana	Pittsburgh	Southwest	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
W135	PEM	Indiana	Pittsburgh	Southwest	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
W136	PEM	Indiana	Pittsburgh	Southwest	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
W-J51	PEM/PFO/ PSS	Indiana	Pittsburgh	Southwest	N	MoB	N	6	Y	Y	4	Rock	0-6" Gravally loam
BB141	PEM	Cambria	Pittsburgh	Southwest	N	Aw	N	8	Y	Y	8	Rock	0-8" Silty clay loam
BB142	PEM, PSS	Cambria	Pittsburgh	Southwest	N	Aw	N	12	Y	Y	12	Fill	0-4" Silt loam; 4-12" Clay loam
BB144	PEM	Cambria	Pittsburgh	Southwest	N	Aw	Y	16	N	N/A	-	-	0-10" Silt loam; 10-16" Sandy loam
BB144	PSS	Cambria	Pittsburgh	Southwest	N	Aw	Y	16	N	N/A	-	-	0-16" Silty clay loam
BB145	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	14	Y	Y	14	Rock	0-4" Silt loam; 4-14" Silty clay loam
BB146	PEM	Cambria	Pittsburgh	Southwest	N	CeC/BtB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB147	PEM, PSS	Cambria	Pittsburgh	Southwest	N	CeC/BtB	N	14	Y	Y	14	Rock	0-6" Silt loam; 6-14" Silty clay loam
BB148	PEM	Cambria	Pittsburgh	Southwest	N	CeC/BtB	N	8	Y	Y	8	Rock	0-3" Silty clay loam; 3-8" Clay loam
BB67	PEM, PSS, PFO	Cambria	Pittsburgh	Southwest	N	UDC/CvB	N	7	Y	Y	7	Rock	0-4" Silt clay loam; 4-7" Clay loam
BB89	PEM	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
CC12	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	16	N	N/A	N/A	N/A	0-1" Silt loam; 1-16" Clay loam
CC13	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	16	N	N/A	N/A	N/A	0-2" Silt loam; 2-16" Clay loam
CC15	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	N/A	N/A	0-2" Silt loam; 2-12" Clay loam
CC15	PFO	Cambria	Pittsburgh	Southwest	N	CvB	Y	12	N	N/A	N/A	N/A	0-2" Silt loam; 2-12" Clay loam
CC16	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	14	N	N/A	N/A	N/A	0-2" Silt loam; 2-14" Clay loam
CC17	PSS	Cambria	Pittsburgh	Southwest	N	BtB	Y	14	N	N/A	N/A	N/A	0-2" Silt loam; 2-14" Clay loam
CC18	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	N/A	N/A	0-12" clay loam
CC19	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	N/A	N/A	0-4" Silt loam; 4-12" Clay loam
CC2	PEM	Cambria	Pittsburgh	Southwest	N	CvD	N	N/A	N/A	N/A	N/A	N/A	N/A
CC20	PEM	Cambria	Pittsburgh	Southwest	N	CvB	N	N/A	N/A	N/A	N/A	N/A	N/A
CC21	PEM	Cambria	Pittsburgh	Southwest	N	CvB	N	N/A	N/A	N/A	N/A	N/A	N/A
CC4	PEM	Cambria	Pittsburgh	Southwest	N	CvB	N	N/A	N/A	N/A	N/A	N/A	N/A
CC6	PEM	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
CC7	PEM	Cambria	Pittsburgh	Southwest	N	CvB	N	N/A	N/A	N/A	N/A	N/A	N/A
K27	PEM	Cambria	Pittsburgh	Southwest	N	HbD	N	N/A	N/A	N/A	N/A	N/A	N/A
K28	PEM	Cambria	Pittsburgh	Southwest	N	CeB/BtB	N	N/A	N/A	N/A	N/A	N/A	N/A
K28	PEM (1)	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	N/A	N/A	0-12" Clay

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
K28	PEM (2)	Cambria	Pittsburgh	Southwest	N	BtB	Y	16	N	N/A	N/A	N/A	0-16" Silty clay loam
K30	PFO	Cambria	Pittsburgh	Southwest	N	Aw	N	6	Y	Y	6	Rock	0-6" Clay loam
K31	PFO	Cambria	Pittsburgh	Southwest	N	Aw/CeB	Y	12	N	N/A	-	-	0-12" Silt loam
K31	PSS	Cambria	Pittsburgh	Southwest	N	BtB	Y	15	N	N/A	-	-	0-15" Silt
L62	PEM, PFO	Cambria	Pittsburgh	Southwest	Y	LtB	N	N/A	N/A	N/A	N/A	N/A	N/A
L63	PEM, PFO	Cambria	Pittsburgh	Southwest	N	CvD	N	N/A	N/A	N/A	N/A	N/A	N/A
L64	PEM, PFO	Cambria	Pittsburgh	Southwest	N	CvB	N	N/A	N/A	N/A	N/A	N/A	N/A
L65	PEM, PFO	Cambria	Pittsburgh	Southwest	N	CvB	N	N/A	N/A	N/A	N/A	N/A	N/A
L66	PEM	Cambria	Pittsburgh	Southwest	N	LaB	N	N/A	N/A	N/A	N/A	N/A	N/A
L68	PEM, PSS, PFO	Cambria	Baltimore	Southwest	Y	CvD	N	N/A	N/A	N/A	N/A	N/A	N/A
M59	PEM, PFO	Cambria	Pittsburgh	Southwest	Y	NoB	N	N/A	N/A	N/A	N/A	N/A	N/A
M60	PEM, PSS	Cambria	Pittsburgh	Southwest	N	CvB	N	5	Y	Y	5	Rock	0-5" Silt loam
M61	PEM, PSS	Cambria	Pittsburgh	Southwest	N	BvB	N	N/A	N/A	N/A	N/A	N/A	N/A
M61	PEM (1)	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	-	-	0-12" Clay
M61	PEM (2)	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	-	-	0-2" Silt loam; 2-12" Clay loam
N1	PEM, PFO	Cambria	Pittsburgh	Southwest	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
N10	PEM	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
N11	PEM, PFO, PUB	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
N12	PEM, PFO	Cambria	Pittsburgh	Southwest	N	WgD	N	N/A	N/A	N/A	N/A	N/A	N/A
N14	PEM	Cambria	Pittsburgh	Southwest	N	WgD	N	N/A	N/A	N/A	N/A	N/A	N/A
N15	PEM, PSS, PFO	Cambria	Pittsburgh	Southwest	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
N17	PEM	Cambria	Pittsburgh	Southwest	N	CeD	N	N/A	N/A	N/A	N/A	N/A	N/A
N18	PEM, PSS, PFO	Cambria	Pittsburgh	Southwest	N	LDF	N	N/A	N/A	N/A	N/A	N/A	N/A
N2	PEM	Cambria	Pittsburgh	Southwest	N	CvB	N	6	N	Y	6	Refusal-Coarse Fragments	0-3" Muck; 3-6" Silt loam
N20	PEM, PFO	Cambria	Pittsburgh	Southwest	N	BtB	N	N/A	N/A	N/A	N/A	N/A	N/A
N20	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	-	-	0-2" Muck; 2-12" Silty clay loam
N20	PFO	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	-	-	0-3" Silt loam; 2-12" Silty clay loam
N24	PEM, PFO	Cambria	Pittsburgh	Southwest	N	BtB	N	N/A	N/A	N/A	N/A	N/A	N/A
N24	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	-	-	0-12" Silt loam
N24	PFO	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	-	-	0-3" Silt loam; 3-12" Clay
N25	PSS	Cambria	Pittsburgh	Southwest	N	BtB	N	N/A	N/A	N/A	N/A	N/A	N/A
N26	PEM, PSS	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
N27	PEM	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
N29	PEM, PFO	Cambria	Pittsburgh	Southwest	N	LDF	N	N/A	N/A	N/A	N/A	N/A	N/A
N30	PEM	Cambria	Pittsburgh	Southwest	N	Aw	N	6	N	Y	6	Refusal-Coarse Fragments	0-2" Silt loam; 2-6" Sandy loam
N31	PEM	Cambria	Pittsburgh	Southwest	N	CvD	N	10	N	Y	10	Refusal-Coarse Fragments	0-3" Silt loam; 3-10" Gravelly silt loam
N33	PEM	Cambria	Pittsburgh	Southwest	N	CvD	N	N/A	N/A	N/A	N/A	N/A	N/A
N4	PEM, PFO	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
N5	PEM	Cambria	Pittsburgh	Southwest	N	URC	N	N/A	N/A	N/A	N/A	N/A	N/A
N6	PEM	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
N8	PEM	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
N9	PEM, PFO	Cambria	Pittsburgh	Southwest	N	AmB	N	N/A	N/A	N/A	N/A	N/A	N/A
O1	PEM, PSS	Cambria	Pittsburgh	Southwest	N	CaB	N	N/A	N/A	N/A	N/A	N/A	N/A
O10	PEM	Cambria	Pittsburgh	Southwest	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
O12	PEM	Cambria	Pittsburgh	Southwest	N	CvB	N	10	N	Y	10	Refusal-Coarse Fragments	0-10" Sandy loam
O15	PEM	Cambria	Pittsburgh	Southwest	N	WgC	N	N/A	N/A	N/A	N/A	N/A	N/A
O16	PEM, PFO	Cambria	Pittsburgh	Southwest	N	Ph	N	8	N	Y	8	Refusal-Coarse Fragments	0-8' Gravelly clay loam
O17	PEM	Cambria	Pittsburgh	Southwest	N	LaB	N	N/A	N/A	N/A	N/A	N/A	N/A

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
O2	PEM, PSS	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
O2	PEM (1, 2)	Cambria	Pittsburgh	Southwest	N	CeC	Y	12	N	N/A	-	-	0-1" Muck 1-12" Clay loam
O2	PEM (3)	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	-	-	0-1" Muck 1-12" Clay loam
O20	PEM, PFO	Cambria	Pittsburgh	Southwest	N	BtB	N	N/A	N/A	N/A	N/A	N/A	N/A
O20	PEM	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	-	-	0-6" Silt loam; 6-12" Silty clay loam
O20	PSS	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	N/A	-	-	0-6" Silt loam; 6-12" Silty clay loam
O21	PEM	Cambria	Pittsburgh	Southwest	N	CeC	N	N/A	N/A	N/A	N/A	N/A	N/A
O23	PEM	Cambria	Pittsburgh	Southwest	N	WgD	N	N/A	N/A	N/A	N/A	N/A	N/A
O24	PEM	Cambria	Pittsburgh	Southwest	N	GtC	N	N/A	N/A	N/A	N/A	N/A	N/A
O25	PEM	Cambria	Pittsburgh	Southwest	N	WgC	N	N/A	N/A	N/A	N/A	N/A	N/A
O27	PEM	Cambria	Pittsburgh	Southwest	N	CaB	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Silty clay loam
O3	PEM, PFO	Cambria	Pittsburgh	Southwest	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
O35	PSS	Cambria	Pittsburgh	Southwest	N	BtB	Y	12	N	Y	8	Coarse fragments	0-12" Silt loam
O35	PSS	Cambria	Pittsburgh	Southwest	N	BtB	N	12	N	Y	8	Refusal-Coarse Fragments	0-12" Silt loam
O37	PEM, PFO	Cambria	Pittsburgh	Southwest	N	Ph	N	N/A	N/A	N/A	N/A	N/A	N/A
O4	PEM	Cambria	Pittsburgh	Southwest	N	WgD	N	8	N	Y	8	Refusal-Coarse Fragments	0-8' Clay loam
O42	PEM	Cambria	Pittsburgh	Southwest	N	WaB	N	10	N	Y	10	Refusal-Coarse Fragments	0-10" Gravelly clay loam
O5	PEM	Cambria	Pittsburgh	Southwest	N	Ph	N	N/A	N/A	N/A	N/A	N/A	N/A
O6	PEM	Cambria	Pittsburgh	Southwest	N	WgD	N	N/A	N/A	N/A	N/A	N/A	N/A
O8	PEM	Cambria	Pittsburgh	Southwest	N	Aw	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Silty clay loam
O9	PEM	Cambria	Pittsburgh	Southwest	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
Q49	PEM	Cambria	Pittsburgh	Southwest	N	CvB	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Silty clay
Q50	PEM	Cambria	Baltimore	Southwest	N	AbB	N	N/A	N/A	N/A	N/A	N/A	N/A
Q50	PEM	Cambria	Baltimore	Southwest	N	AbB	Y	18	N	N/A	-	-	0-18" Clay loam
Q65	PEM	Cambria	Baltimore	Southwest	N	HbB	N	N/A	N/A	N/A	N/A	N/A	N/A
W137	PEM	Cambria	Baltimore	Southwest	N	CvD	N	6	Y	Y	6	Bedrock	0-3" Silt loam; 3-6" Sandy loam
W138	PEM	Cambria	Baltimore	Southwest	N	CvD	N	6	Y	Y	6	Bedrock	0-3" Silt loam; 3-6" Sandy loam
W139	PEM	Cambria	Baltimore	Southwest	N	CvD	N	6	Y	Y	6	Bedrock	0-2" Silt loam; 2-6" Sandy loam
W140	PEM	Cambria	Baltimore	Southwest	N	CvD	N	N/A	N/A	N/A	N/A	N/A	N/A
BB101	PEM	Blair	Baltimore	Southcentral	N	BxD	N	12	Y	Y	12	Rock	0-2" Organic; 2-12" Clay loam
BB103	PEM, PSS	Blair	Baltimore	Southcentral	N	LeD	N	N/A	N/A	N/A	N/A	N/A	N/A
BB107	PEM, PFO	Blair	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB108	PEM	Blair	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB108	PEM, PSS, PFO	Blair	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB110	PEM, PFO	Blair	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB111	PEM	Blair	Baltimore	Southcentral	N	CvD	N	N/A	N/A	N/A	N/A	N/A	N/A
BB120	PEM, PSS	Blair	Baltimore	Southcentral	N	BmF	N	8	Y	Y	8	Rock	0-8" Loam
BB124	PEM, PSS, PFO	Blair	Baltimore	Southcentral	N	Pu	N	N/A	N/A	N/A	N/A	N/A	N/A
BB125	PEM	Blair	Baltimore	Southcentral	N	Ho	N	N/A	N/A	N/A	N/A	N/A	N/A
BB51	PEM	Blair	Baltimore	Southcentral	Y	Ho	N	10	Y	Y	10	Rock	0-2" Organic; 2-10" Silty clay loam
BB52	PEM, PSS	Blair	Baltimore	Southcentral	N	BuB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB56	PEM, PSS	Blair	Baltimore	Southcentral	N	AbB	N	8	Y	Y	8	Rock	0-8" Silt clay loam
BB58	PEM, PSS	Blair	Baltimore	Southcentral	N	Ba	N	N/A	N/A	N/A	N/A	N/A	N/A
BB59	PEM	Blair	Baltimore	Southcentral	N	MsD	N	6	Y	Y	6	Rock	0-6" Silty clay loam
BB60	PEM	Blair	Baltimore	Southcentral	Y	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
L35	PEM	Blair	Baltimore	Southcentral	N	Lp	N	N/A	N/A	N/A	N/A	N/A	N/A

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
L40	PEM	Blair	Baltimore	Southcentral	N	Ba	N	8	N	Y	8	Refusal-Coarse Fragments	0-5" Muck; 5-8" Gravelly silt loam
L42	PEM	Blair	Baltimore	Southcentral	N	ErC	N	N/A	N/A	N/A	N/A	N/A	N/A
L43	PEM	Blair	Baltimore	Southcentral	N	ErB	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Loam
L44	PEM	Blair	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
L46	PEM	Blair	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
L48	PEM	Blair	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
L54	PEM, PSS, PFO	Blair	Baltimore	Southcentral	N	BkD	N	N/A	N/A	N/A	N/A	N/A	N/A
L55	PEM, PFO	Blair	Baltimore	Southcentral	N	Ba	N	N/A	N/A	N/A	N/A	N/A	N/A
L56	PEM, PFO	Blair	Baltimore	Southcentral	N	MoB	N	N/A	N/A	N/A	N/A	N/A	N/A
L61	PEM, PFO	Blair	Baltimore	Southcentral	N	AbB	N	N/A	N/A	N/A	N/A	N/A	N/A
L70	PFO	Blair	Baltimore	Southcentral	N	LeD	N	N/A	N/A	N/A	N/A	N/A	N/A
M23	PEM	Blair	Baltimore	Southcentral	N	Lp	N	10	N	Y	10	Refusal-Coarse Fragments	0-10" Loamy sand
M24	PEM	Blair	Baltimore	Southcentral	N	Ba	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Silty clay loam
M26	PEM	Blair	Baltimore	Southcentral	N	OuD	N	12	N	Y	12	Refusal-Coarse Fragments	0-12" No texture provided
M29	PEM 1,2	Blair	Baltimore	Southcentral	N	BxD	N	10,8	N	Y	10,8	Refusal-Coarse Fragments	0-10" silt loam, 0-8" Silt loam
M35	PFO	Blair	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
M49	PEM, PSS, PFO	Blair	Baltimore	Southcentral	N	BoB	N	9	N	Y	9	Refusal-Coarse Fragments	0-9" Silty clay loam
M50	PEM	Blair	Baltimore	Southcentral	N	BmD	N	N/A	N/A	N/A	N/A	N/A	N/A
M55	PEM	Blair	Baltimore	Southcentral	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
M56	PEM	Blair	Baltimore	Southcentral	N	BoC	N	6	N	Y	6	Refusal-Coarse Fragments	0-6" Silt loam
M57	PEM	Blair	Baltimore	Southcentral	N	AbB	N	N/A	N/A	N/A	N/A	N/A	N/A
M79	PFO	Blair	Baltimore	Southcentral	N	BoB	N	12	N	Y	12	Refusal-Coarse Fragments	0-4" Silty clay loam; 4-12" Silty clay loam
Q51	PEM	Blair	Baltimore	Southcentral	N	AbB	N	10	N	Y	10	Refusal-Coarse Fragments	0-10" Gravelly sandy clay loam
Q52	PEM	Blair	Baltimore	Southcentral	N	LkD	N	N/A	N/A	N/A	N/A	N/A	N/A
Q54	PEM	Blair	Baltimore	Southcentral	N	CbB	N	N/A	N/A	N/A	N/A	N/A	N/A
Q56	PEM	Blair	Baltimore	Southcentral	N	CbB	N	N/A	N/A	N/A	N/A	N/A	N/A
Q57	PFO	Blair	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
Q58	PEM	Blair	Baltimore	Southcentral	N	Qu	N	N/A	N/A	N/A	N/A	N/A	N/A
BB127	PEM, PSS, PFO	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
CC27	PEM	Huntingdon	Baltimore	Southcentral	N	BoB	N	N/A	N/A	N/A	N/A	N/A	N/A
CC28	PEM	Huntingdon	Baltimore	Southcentral	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
K63	PEM	Huntingdon	Baltimore	Southcentral	N	BMF	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Gravelly silt loam
K65	PEM	Huntingdon	Baltimore	Southcentral	N	BMF	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Gravelly silt loam
K66	PEM	Huntingdon	Baltimore	Southcentral	N	BMF	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Gravelly silt loam

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PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
K67	PEM	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
K68	PEM, PSS, PFO	Huntingdon	Baltimore	Southcentral	N	Aw	N	10	N	Y	10	Refusal-Coarse Fragments	0-10" Clay loam
K69	PEM	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
K70	PEM	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
K72	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
L10	PEM	Huntingdon	Baltimore	Southcentral	N	LcD	N	N/A	N/A	N/A	N/A	N/A	N/A
L11	PEM	Huntingdon	Baltimore	Southcentral	N	Ne	N	N/A	N/A	N/A	N/A	N/A	N/A
L12	PEM	Huntingdon	Baltimore	Southcentral	N	Ne	N	N/A	N/A	N/A	N/A	N/A	N/A
L13	PEM	Huntingdon	Baltimore	Southcentral	N	Ne	N	N/A	N/A	N/A	N/A	N/A	N/A
L14	PEM	Huntingdon	Baltimore	Southcentral	N	Ne	N	N/A	N/A	N/A	N/A	N/A	N/A
L15	PEM	Huntingdon	Baltimore	Southcentral	N	ErB	N	N/A	N/A	N/A	N/A	N/A	N/A
L16	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
L17	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
L18	PEM	Huntingdon	Baltimore	Southcentral	N	AoB	N	N/A	N/A	N/A	N/A	N/A	N/A
L20	PEM	Huntingdon	Baltimore	Southcentral	N	AoB	N	N/A	N/A	N/A	N/A	N/A	N/A
L21	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
L24	PEM	Huntingdon	Baltimore	Southcentral	N	AoB	N	N/A	N/A	N/A	N/A	N/A	N/A
L27	PEM	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
L28	PEM	Huntingdon	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
L29	PEM	Huntingdon	Baltimore	Southcentral	N	AoB	N	N/A	N/A	N/A	N/A	N/A	N/A
L31	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	5	N	Y	5	Refusal-Coarse Fragments	0-5" Clay loam
L32	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	12	N	Y	12	Refusal-Coarse Fragments	0-12" Silt loam
L33a [L33]	PEM	Huntingdon	Baltimore	Southcentral	N	AoB	N	N/A	N/A	N/A	N/A	N/A	N/A
L36	PSS	Huntingdon	Baltimore	Southcentral	N	Nw	N	N/A	N/A	N/A	N/A	N/A	N/A
L5	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
L6	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	N/A	N/A	N/A	N/A	N/A	N/A
L7	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	8	N	Y	8	Refusal-Coarse Fragments	0-4" Sandy silt loam; 4-8" Sand
L8	PEM	Huntingdon	Baltimore	Southcentral	N	BxD	N	8	N	Y	8	Refusal-Coarse Fragments	0-4" Sandy silt loam; 4-8" Sand
L9	PEM	Huntingdon	Baltimore	Southcentral	N	LDF	N	8	N	Y	8	Refusal-Coarse Fragments	0-4" Sandy silt loam; 4-8" Sand
M1	PEM	Huntingdon	Baltimore	Southcentral	N	WeD/BrD	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Gravelly silt loam
M10	PEM	Huntingdon	Baltimore	Southcentral	N	BMF	N	N/A	N/A	N/A	N/A	N/A	N/A
M12	PEM	Huntingdon	Baltimore	Southcentral	N	BoC	N	N/A	N/A	N/A	N/A	N/A	N/A
M13	PEM	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
M15	PEM	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
M17	PEM	Huntingdon	Baltimore	Southcentral	N	ErC	N	N/A	N/A	N/A	N/A	N/A	N/A
M2	PEM	Huntingdon	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
M3	PEM, PSS	Huntingdon	Baltimore	Southcentral	N	HTD	N	N/A	N/A	N/A	N/A	N/A	N/A
M6	PEM	Huntingdon	Baltimore	Southcentral	N	LcD	N	6	N	Y	6	Refusal-Coarse Fragments	0-6" Gravally silt loam
M7	PEM	Huntingdon	Baltimore	Southcentral	N	Ph	N	N/A	N/A	N/A	N/A	N/A	N/A
M8	PEM	Huntingdon	Baltimore	Southcentral	N	WeB	N	N/A	N/A	N/A	N/A	N/A	N/A
M9	PEM	Huntingdon	Baltimore	Southcentral	N	BMF	N	N/A	N/A	N/A	N/A	N/A	N/A
W332	PEM	Huntingdon	Baltimore	Southcentral	N	BuB	N	4	Y	Y	4	Bedrock/Shale	0-4" Loam
W333	PEM	Huntingdon	Baltimore	Southcentral	N	BuB	N	3	Y	Y	3	Shale	0-3" Shale
W46b	PEM, PSS	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
Y1	PFO	Huntingdon	Baltimore	Southcentral	N	BoB	N	N/A	N/A	N/A	N/A	N/A	N/A
Y12	PEM	Huntingdon	Baltimore	Southcentral	N	ApB	N	N/A	N/A	N/A	N/A	N/A	N/A

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Y13	PEM	Huntingdon	Baltimore	Southcentral	N	EgC	N	4	Y	Y	4	Rock	0-4" Silt loam
Y14	PEM	Huntingdon	Baltimore	Southcentral	N	Ne	N	N/A	N/A	N/A	N/A	N/A	N/A
Y2	PSS	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
Y3	PSS	Huntingdon	Baltimore	Southcentral	N	BMF	N	N/A	N/A	N/A	N/A	N/A	N/A
Y4	PFO	Huntingdon	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
Y6	PFO	Huntingdon	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
Y7	PEM, PFO	Huntingdon	Baltimore	Southcentral	N	ErB	N	6	Y	Y	6	Rock	0-6" Silty clay loam
K58	PEM	Juniata	Baltimore	Southcentral	N	Ty	N	N/A	N/A	N/A	N/A	N/A	N/A
K59	PEM	Juniata	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
K60	PFO	Juniata	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
L3	PEM	Juniata	Baltimore	Southcentral	N	BlD	N	N/A	N/A	N/A	N/A	N/A	N/A
Q64	PEM	Juniata	Baltimore	Southcentral	N	Ty	N	N/A	N/A	N/A	N/A	N/A	N/A
J56	PEM	Perry	Baltimore	Southcentral	N	Mf	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Sandy silt loam
J57	PEM	Perry	Baltimore	Southcentral	N	BhD	N	8	N	Y	8	Refusal-Coarse Fragments	0-4" Muck; 4-8" Sandy Silt loam
J69	PEM	Perry	Baltimore	Southcentral	N	BxC	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Gravelly clay loam
K49	PEM	Perry	Baltimore	Southcentral	N	Bc	N	6	N	Y	6	Refusal-Coarse Fragments	0-6" Gravelly clay loam
K50	PEM	Perry	Baltimore	Southcentral	N	AbC	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Gravelly clay loam
K52	PEM, PSS	Perry	Baltimore	Southcentral	N	BxB	N	5	N	Y	5	Refusal-Coarse Fragments	0-5" Gravelly clay loam
K53	PEM	Perry	Baltimore	Southcentral	N	AbC	N	8	N	Y	8	Refusal-Coarse Fragments	0-3" Silt loam; 3-8" Clay loam
K54	PEM	Perry	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
K55	PEM	Perry	Baltimore	Southcentral	N	AbB	N	N/A	N/A	N/A	N/A	N/A	N/A
L1	PEM, PFO	Perry	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
L2	PEM, PSS	Perry	Baltimore	Southcentral	N	BrA	N	N/A	N/A	N/A	N/A	N/A	N/A
Q63	PEM	Perry	Baltimore	Southcentral	N	WkF	N	16	N	Y	16	Refusal-Coarse Fragments	0-16" Silty clay loam
W25e	PEM, PSS	Perry	Baltimore	Southcentral	N	EtB	N	N/A	N/A	N/A	N/A	N/A	N/A
W26e	PEM, PFO	Perry	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
W338	PEM	Perry	Baltimore	Southcentral	N	EtB	N	N/A	N/A	N/A	N/A	N/A	N/A
W36d	PEM	Perry	Baltimore	Southcentral	N	BhD	N	6	Y	Y	6	Rock	0-2" Loam; 2-6" Sandy clay loam
BB129	PEM	Cumberland	Baltimore	Southcentral	N	HaB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB15	PEM	Cumberland	Baltimore	Southcentral	N	Mf	N	N/A	N/A	N/A	N/A	N/A	N/A
BB151	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB155	PEM, PSS, PFO	Cumberland	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
BB43	PEM	Cumberland	Baltimore	Southcentral	N	BdB	N	6	Y	Y	6	Rock	0-6" Silty clay loam
BB44	PEM	Cumberland	Baltimore	Southcentral	N	BdC	N	N/A	N/A	N/A	N/A	N/A	N/A
H54	PEM	Cumberland	Baltimore	Southcentral	N	NhD	N	N/A	N/A	N/A	N/A	N/A	N/A
I24	PEM, PFO	Cumberland	Baltimore	Southcentral	N	Ls	N	N/A	N/A	N/A	N/A	N/A	N/A
I25	PEM	Cumberland	Baltimore	Southcentral	N	NeC	N	10	N	Y	10	Refusal-Coarse Fragments	0-10" Clay loam
I26	PEM	Cumberland	Baltimore	Southcentral	N	NeC	N	N/A	N/A	N/A	N/A	N/A	N/A
I27	PEM	Cumberland	Baltimore	Southcentral	N	NeC	N	N/A	N/A	N/A	N/A	N/A	N/A
I30	PEM	Cumberland	Baltimore	Southcentral	N	Wa	N	N/A	N/A	N/A	N/A	N/A	N/A
I30	PEM	Cumberland	Baltimore	Southcentral	N	Wa	Y	12	N	N/A	-	-	0-4" Loam; 4-12" Clay loam
I31	PEM	Cumberland	Baltimore	Southcentral	N	Wa	N	N/A	N/A	N/A	N/A	N/A	N/A
I32	PFO	Cumberland	Baltimore	Southcentral	N	Wa	N	N/A	N/A	N/A	N/A	N/A	N/A

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
I36	PFO	Cumberland	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
I38	PEM, PFO	Cumberland	Baltimore	Southcentral	N	WkF	N	N/A	N/A	N/A	N/A	N/A	N/A
I38	PEM, PFO	Cumberland	Baltimore	Southcentral	N	WkF	N	N/A	N/A	N/A	N/A	N/A	N/A
I39	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
I41	PEM	Cumberland	Baltimore	Southcentral	N	BrA	N	N/A	N/A	N/A	N/A	N/A	N/A
I42	PSS	Cumberland	Baltimore	Southcentral	N	BrA	N	N/A	N/A	N/A	N/A	N/A	N/A
I43	PEM	Cumberland	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
I44	PEM	Cumberland	Baltimore	Southcentral	N	BeD	N	N/A	N/A	N/A	N/A	N/A	N/A
I45	PEM	Cumberland	Baltimore	Southcentral	N	BeD	N	N/A	N/A	N/A	N/A	N/A	N/A
I46	PEM	Cumberland	Baltimore	Southcentral	N	WkF	N	8	N	Y	8	Refusal-Coarse Fragments	" Gravelly clay loam; 4-8" Gravelly silt llo
I48	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
I49	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
I52	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
I53	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
I54	PEM	Cumberland	Baltimore	Southcentral	N	LdC	N	N/A	N/A	N/A	N/A	N/A	N/A
I55	PEM	Cumberland	Baltimore	Southcentral	N	LgD	N	N/A	N/A	N/A	N/A	N/A	N/A
I56	PEM	Cumberland	Baltimore	Southcentral	N	BxB	N	N/A	N/A	N/A	N/A	N/A	N/A
I58	PEM	Cumberland	Baltimore	Southcentral	N	WeC	N	10	N	Y	10	Refusal-Coarse Fragments	0-10" Silt loam
I60	PEM	Cumberland	Baltimore	Southcentral	N	WeC	N	N/A	N/A	N/A	N/A	N/A	N/A
I61	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
I62	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
I63	PEM	Cumberland	Baltimore	Southcentral	N	BrA	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Silt loam
I64	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	6	N	Y	6	Refusal-Coarse Fragments	0-2" Muck; 2-6" Sand loam
J10	PEM	Cumberland	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
J11	PEM	Cumberland	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
J13	PEM, PSS	Cumberland	Baltimore	Southcentral	N	WeD	N	10	N	Y	10	Refusal-Coarse Fragments	0-5" Muck; 5-10" Gravelly clay loam
J14	PEM	Cumberland	Baltimore	Southcentral	N	WeD	N	N/A	N/A	N/A	N/A	N/A	N/A
J15	PEM, PSS, PFO	Cumberland	Baltimore	Southcentral	N	Mf	N	N/A	N/A	N/A	N/A	N/A	N/A
J20	PEM	Cumberland	Baltimore	Southcentral	N	WeD	N	N/A	N/A	N/A	N/A	N/A	N/A
J21	PEM	Cumberland	Baltimore	Southcentral	N	WeC	N	N/A	N/A	N/A	N/A	N/A	N/A
J22	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
J23	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
J24	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
J25	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
J26	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
J27	PEM	Cumberland	Baltimore	Southcentral	N	WeD	N	N/A	N/A	N/A	N/A	N/A	N/A
J31	PEM	Cumberland	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
J32	PEM	Cumberland	Baltimore	Southcentral	N	WeC	N	N/A	N/A	N/A	N/A	N/A	N/A
J35	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
J36	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
J40	PEM	Cumberland	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
J9	PEM	Cumberland	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
K1	PEM	Cumberland	Baltimore	Southcentral	N	BrA	N	N/A	N/A	N/A	N/A	N/A	N/A
K11	PEM	Cumberland	Baltimore	Southcentral	N	BhD	N	8	N	Y	8	Refusal-Coarse Fragments	0-2" Silty clay; 2-8" Clay
K12	PEM	Cumberland	Baltimore	Southcentral	N	AoB	N	10	N	Y	10	Refusal-Coarse Fragments	0-3" Silt loam; 3-10" Sand

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
K13	PEM	Cumberland	Baltimore	Southcentral	N	AoB	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Clay
K14	PEM	Cumberland	Baltimore	Southcentral	N	BhD	N	N/A	N/A	N/A	N/A	N/A	N/A
K15	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	6	N	Y	6	Refusal-Coarse Fragments	0-6" Silt loam
K16	PEM	Cumberland	Baltimore	Southcentral	N	BpB	N	N/A	N/A	N/A	N/A	N/A	N/A
K2	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
K3	PEM	Cumberland	Baltimore	Southcentral	N	BrB	N	N/A	N/A	N/A	N/A	N/A	N/A
K35	PEM	Cumberland	Baltimore	Southcentral	N	BpB	N	N/A	N/A	N/A	N/A	N/A	N/A
K41	PEM	Cumberland	Baltimore	Southcentral	N	BeB	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Gravelly sily loam
K43	PEM	Cumberland	Baltimore	Southcentral	N	BpB	N	N/A	N/A	N/A	N/A	N/A	N/A
K44	PEM, PFO	Cumberland	Baltimore	Southcentral	N	MnB	N	10	N	Y	10	Refusal-Coarse Fragments	0-10" Clay loam
K5	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
K6	PEM	Cumberland	Baltimore	Southcentral	N	BrA	N	N/A	N/A	N/A	N/A	N/A	N/A
K7	PEM	Cumberland	Baltimore	Southcentral	N	BxB	N	8	N	Y	8	Refusal-Coarse Fragments	0-3" Muck; 3-8" Silt
K9	PEM	Cumberland	Baltimore	Southcentral	N	BxB	N	N/A	N/A	N/A	N/A	N/A	N/A
KP2	PFO	Cumberland	Baltimore	Southcentral	N	HaC	Y	12	N	N/A	-	-	0-12" Silt loam
W14e	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
W177	PEM	Cumberland	Baltimore	Southcentral	N	Aw	N	N/A	N/A	N/A	N/A	N/A	N/A
W19d	PEM	Cumberland	Baltimore	Southcentral	N	BeC	N	N/A	N/A	N/A	N/A	N/A	N/A
W22d	PEM	Cumberland	Baltimore	Southcentral	N	BxB	N	10	Y	Y	10	Rock	0-10" Sand loam
W33d	PEM	Cumberland	Baltimore	Southcentral	N	WkF	N	N/A	N/A	N/A	N/A	N/A	N/A
BB1	PEM	York	Baltimore	Southcentral	N	NhD	N	N/A	N/A	N/A	N/A	N/A	N/A
BB152	PEM	York	Baltimore	Southcentral	N	WbB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB21	PEM	York	Baltimore	Southcentral	N	NhD	N	N/A	N/A	N/A	N/A	N/A	N/A
H50	PEM	York	Baltimore	Southcentral	N	NhD	N	N/A	N/A	N/A	N/A	N/A	N/A
H51	PEM, PFO	York	Baltimore	Southcentral	N	NhD	N	N/A	N/A	N/A	N/A	N/A	N/A
I20	PEM	York	Baltimore	Southcentral	N	WbB	N	N/A	N/A	N/A	N/A	N/A	N/A
I22	PEM	York	Baltimore	Southcentral	N	LgC	N	N/A	N/A	N/A	N/A	N/A	N/A
I23	PEM	York	Baltimore	Southcentral	N	NdB	N	N/A	N/A	N/A	N/A	N/A	N/A
J63	PFO	York	Baltimore	Southcentral	N	WbB	N	N/A	N/A	N/A	N/A	N/A	N/A
W3c	PEM	York	Baltimore	Southcentral	N	NdB	N	N/A	N/A	N/A	N/A	N/A	N/A
A16	PEM	Dauphin	Baltimore	Southcentral	N	LrB2	N	N/A	N/A	N/A	N/A	N/A	N/A
A17	PEM	Dauphin	Baltimore	Southcentral	N	Bc	N	N/A	N/A	N/A	N/A	N/A	N/A
A18	PSS	Dauphin	Baltimore	Southcentral	N	Ua	N	N/A	N/A	N/A	N/A	N/A	N/A
A22	PEM	Dauphin	Baltimore	Southcentral	N	LrC2	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Sand
A23	PEM	Dauphin	Baltimore	Southcentral	N	Bc	N	N/A	N/A	N/A	N/A	N/A	N/A
A25	PEM	Dauphin	Baltimore	Southcentral	N	Aw/PeC2	N	N/A	N/A	N/A	N/A	N/A	N/A
A27	PEM	Dauphin	Baltimore	Southcentral	N	Bc	N	N/A	N/A	N/A	N/A	N/A	N/A
B55	PEM	Dauphin	Baltimore	Southcentral	N	BrC2	N	12	N	Y	12	Refusal-Coarse Fragments	0-12" Silt loam
B56	PEM	Dauphin	Baltimore	Southcentral	N	Cr	N	N/A	N/A	N/A	N/A	N/A	N/A
B57	PEM	Dauphin	Baltimore	Southcentral	N	Cr	N	N/A	N/A	N/A	N/A	N/A	N/A
B58	PEM, PFO	Dauphin	Baltimore	Southcentral	N	Cr	N	10	N	Y	10	Refusal-Coarse Fragments	0-12" Sand loam
B59	PEM	Dauphin	Baltimore	Southcentral	N	Bc	N	N/A	N/A	N/A	N/A	N/A	N/A
B60	PEM	Dauphin	Baltimore	Southcentral	N	Bc	N	N/A	N/A	N/A	N/A	N/A	N/A
B61	PEM, PFO	Dauphin	Baltimore	Southcentral	N	BrCB2. Cr	N	N/A	N/A	N/A	N/A	N/A	N/A
B64	PFO	Dauphin	Baltimore	Southcentral	N	CnB2	N	N/A	N/A	N/A	N/A	N/A	N/A
B76	PSS	Dauphin	Baltimore	Southcentral	N	Bc	N	N/A	N/A	N/A	N/A	N/A	N/A

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Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
BB36	PEM	Dauphin	Baltimore	Southcentral	N	BrB2	N	9	Y	Y	9	Rock	0-6" Silty clay loam; 6-9" Sandy loam
BB39	PEM	Dauphin	Baltimore	Southcentral	N	Bc	N	N/A	N/A	N/A	N/A	N/A	N/A
BB41	PEM	Dauphin	Baltimore	Southcentral	N	LrC2	N	N/A	N/A	N/A	N/A	N/A	N/A
C26	PEM, PFO	Dauphin	Baltimore	Southcentral	N	Wc/Cr	N	N/A	N/A	N/A	N/A	N/A	N/A
C27	PEM, PSS	Dauphin	Baltimore	Southcentral	N	NsB	N	N/A	N/A	N/A	N/A	N/A	N/A
C28	PEM	Dauphin	Baltimore	Southcentral	N	LrB2	N	N/A	N/A	N/A	N/A	N/A	N/A
CC22	PEM	Dauphin	Baltimore	Southcentral	N	LrC2	N	14	Y	Y	14	Rock	0-14' Silty clay loam
J47	PEM, PFO	Dauphin	Baltimore	Southcentral	N	BtA	N	N/A	N/A	N/A	N/A	N/A	N/A
K23	PEM	Dauphin	Baltimore	Southcentral	N	LrD2	N	N/A	N/A	N/A	N/A	N/A	N/A
A1	PEM	Lebanon	Baltimore	Southcentral	N	UPE	N	N/A	N/A	N/A	N/A	N/A	N/A
A11	PEM	Lebanon	Baltimore	Southcentral	N	CkB/Me	N	N/A	N/A	N/A	N/A	N/A	N/A
A12	PEM	Lebanon	Baltimore	Southcentral	N	Me	N	N/A	N/A	N/A	N/A	N/A	N/A
A13	PEM	Lebanon	Baltimore	Southcentral	N	Me	N	N/A	N/A	N/A	N/A	N/A	N/A
A19	PEM	Lebanon	Baltimore	Southcentral	N	Me	N	N/A	N/A	N/A	N/A	N/A	N/A
A2	PEM	Lebanon	Baltimore	Southcentral	N	Ro	N	N/A	N/A	N/A	N/A	N/A	N/A
A3	PEM	Lebanon	Baltimore	Southcentral	N	Bm	N	N/A	N/A	N/A	N/A	N/A	N/A
A4	PEM	Lebanon	Baltimore	Southcentral	N	Bm	N	N/A	N/A	N/A	N/A	N/A	N/A
A6	PEM	Lebanon	Baltimore	Southcentral	N	Bm	N	N/A	N/A	N/A	N/A	N/A	N/A
A9	PEM	Lebanon	Baltimore	Southcentral	N	WaA	N	N/A	N/A	N/A	N/A	N/A	N/A
B66	PEM	Lebanon	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
BB154	PEM	Lebanon	Baltimore	Southcentral	N	No	N	N/A	N/A	N/A	N/A	N/A	N/A
C16	PEM, PFO	Lebanon	Baltimore	Southcentral	N	UnC	N	N/A	N/A	N/A	N/A	N/A	N/A
C17	PEM	Lebanon	Baltimore	Southcentral	N	NhC	N	8	N	Y	8	Refusal-Coarse Fragments	-8" Silt loam (PFO), 0-8" Clay loam (PEM
CJ2	PEM	Lebanon	Baltimore	Southcentral	N	Me	N	6	N	Y	6	Refusal-Coarse Fragments	0-1" Silt; 2-6" Gravelly silt loam
H13	PEM, PSS, PFO	Lebanon	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
H14	PEM, PFO	Lebanon	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
H4	PEM	Lebanon	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
W5c	PEM	Lebanon	Baltimore	Southcentral	N	HaB	N	N/A	N/A	N/A	N/A	N/A	N/A
A52	PEM	Lancaster	Baltimore	Southcentral	N	Hg	N	N/A	N/A	N/A	N/A	N/A	N/A
A54	PEM, PFO	Lancaster	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
A55	PEM	Lancaster	Baltimore	Southcentral	N	Bo	N	10	N	Y	10	Refusal-Coarse Fragments	0-3" Muck; 3-10" Sandy clay loam
A56	PEM	Lancaster	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
B10	PEM	Lancaster	Baltimore	Southcentral	N	RaB/UaB	N	N/A	N/A	N/A	N/A	N/A	N/A
B11	PEM	Lancaster	Baltimore	Southcentral	N	UaB	N	N/A	N/A	N/A	N/A	N/A	N/A
B5	PEM	Lancaster	Baltimore	Southcentral	N	BuB	N	N/A	N/A	N/A	N/A	N/A	N/A
B7	PEM	Lancaster	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
B72	PEM	Lancaster	Baltimore	Southcentral	N	Hg	N	N/A	N/A	N/A	N/A	N/A	N/A
B74	PEM	Lancaster	Baltimore	Southcentral	N	Rd	N	N/A	N/A	N/A	N/A	N/A	N/A
H28	PEM	Lancaster	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
J54	PFO	Lancaster	Baltimore	Southcentral	N	Bo/Rd	N	N/A	N/A	N/A	N/A	N/A	N/A
K32	PEM	Lancaster	Baltimore	Southcentral	N	Hg	N	N/A	N/A	N/A	N/A	N/A	N/A
W8c	PEM	Lancaster	Baltimore	Southcentral	N	BuB	N	N/A	N/A	N/A	N/A	N/A	N/A
A37	PEM	Berks	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
A45	PEM	Berks	Baltimore	Southcentral	N	NaC	N	N/A	N/A	N/A	N/A	N/A	N/A
A49	PEM	Berks	Baltimore	Southcentral	N	JpF	N	N/A	N/A	N/A	N/A	N/A	N/A
AM2	PEM	Berks	Philadelphia	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
B16	PEM	Berks	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
B18	PEM	Berks	Baltimore	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
B21	PEM	Berks	Philadelphia	Southcentral	N	ToA	N	N/A	N/A	N/A	N/A	N/A	N/A
B22	PEM	Berks	Philadelphia	Southcentral	N	ToA	N	N/A	N/A	N/A	N/A	N/A	N/A
B24	PEM	Berks	Philadelphia	Southcentral	Y	LaD	N	7	N	Y	7	Refusal-Coarse Fragments	0-3" Silty clay loam; 3-7" Silt loam
B26	PEM	Berks	Philadelphia	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
B27	PEM	Berks	Philadelphia	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
B28	PEM	Berks	Philadelphia	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
B29	PEM	Berks	Philadelphia	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
B30	PEM	Berks	Philadelphia	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
B31	PEM	Berks	Philadelphia	Southcentral	N	JnC	N	N/A	N/A	N/A	N/A	N/A	N/A
B32	PEM	Berks	Philadelphia	Southcentral	N	JnB	N	N/A	N/A	N/A	N/A	N/A	N/A
B33	PEM	Berks	Philadelphia	Southcentral	N	JnC/JnB	N	N/A	N/A	N/A	N/A	N/A	N/A
B40	PEM	Berks	Baltimore	Southcentral	N	JnB	N	N/A	N/A	N/A	N/A	N/A	N/A
B42	PEM	Berks	Philadelphia	Southcentral	Y	ToA	N	9	N	Y	9	Refusal-Coarse Fragments	0-9" Silt loam
B43	PEM	Berks	Philadelphia	Southcentral	Y	LbD	N	3	N	Y	3	Refusal-Coarse Fragments	0-3" Gravelly sand loam
B44	PEM	Berks	Philadelphia	Southcentral	N	ToA	N	N/A	N/A	N/A	N/A	N/A	N/A
B48	PEM	Berks	Philadelphia	Southcentral	N	ToA	N	N/A	N/A	N/A	N/A	N/A	N/A
B49	PSS	Berks	Baltimore	Southcentral	N	Hg	N	N/A	N/A	N/A	N/A	N/A	N/A
BA10	PEM	Berks	Baltimore	Southcentral	N	NhD	N	N/A	N/A	N/A	N/A	N/A	N/A
BB42	PSS, PFO	Berks	Philadelphia	Southcentral	N	AbA	N	N/A	N/A	N/A	N/A	N/A	N/A
C1	PEM	Berks	Philadelphia	Southcentral	N	JnD	N	N/A	N/A	N/A	N/A	N/A	N/A
C12	PEM	Berks	Philadelphia	Southcentral	N	ToA/LaB	N	N/A	N/A	N/A	N/A	N/A	N/A
C13	PEM	Berks	Philadelphia	Southcentral	N	ToA	N	N/A	N/A	N/A	N/A	N/A	N/A
C2	PEM	Berks	Philadelphia	Southcentral	N	JnD	N	N/A	N/A	N/A	N/A	N/A	N/A
C5	PEM	Berks	Philadelphia	Southcentral	N	ReB	N	N/A	N/A	N/A	N/A	N/A	N/A
C6	PEM, PSS	Berks	Philadelphia	Southcentral	N	CwA	N	N/A	N/A	N/A	N/A	N/A	N/A
H21	PEM	Berks	Philadelphia	Southcentral	N	JpD	N	N/A	N/A	N/A	N/A	N/A	N/A
H22	PEM	Berks	Philadelphia	Southcentral	N	JpD	N	12	N	Y	12	Refusal-Coarse Fragments	0-12" Sand loam
H23	PEM	Berks	Baltimore	Southcentral	N	JpB	N	N/A	N/A	N/A	N/A	N/A	N/A
H24	PEM	Berks	Baltimore	Southcentral	N	JpB	N	N/A	N/A	N/A	N/A	N/A	N/A
H25	PEM	Berks	Philadelphia	Southcentral	N	JpB	N	N/A	N/A	N/A	N/A	N/A	N/A
H26	PEM	Berks	Baltimore	Southcentral	N	JpB	N	N/A	N/A	N/A	N/A	N/A	N/A
J48	PEM, PFO	Berks	Baltimore	Southcentral	N	NhD	N	N/A	N/A	N/A	N/A	N/A	N/A
J71	PEM	Berks	Philadelphia	Southcentral	N	AbA	N	N/A	N/A	N/A	N/A	N/A	N/A
K25	PEM	Berks	Philadelphia	Southcentral	N	LaC	N	N/A	N/A	N/A	N/A	N/A	N/A
Q80	PFO	Berks	Philadelphia	Southcentral	N	JpF	N	N/A	N/A	N/A	N/A	N/A	N/A
W301	PEM	Berks	Philadelphia	Southcentral	N	AbB	N	N/A	N/A	N/A	N/A	N/A	N/A
W302	PEM	Berks	Philadelphia	Southcentral	N	Bo	N	N/A	N/A	N/A	N/A	N/A	N/A
W35	PEM	Berks	Baltimore	Southcentral	N	JpB	N	N/A	N/A	N/A	N/A	N/A	N/A
W48a	PEM	Berks	Philadelphia	Southcentral	N	ReB	N	N/A	N/A	N/A	N/A	N/A	N/A
A46	PEM	Chester	Philadelphia	Southeast	N	GdB	N	4	N	Y	4	Refusal-Coarse Fragments	0-4" Gravelly Silty clay loam
B12	PEM	Chester	Philadelphia	Southeast	N	Co	N	N/A	N/A	N/A	N/A	N/A	N/A
B13	PEM	Chester	Philadelphia	Southeast	N	CpA	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Sandy clay loam
B14	PEM, PFO	Chester	Philadelphia	Southeast	N	CpA	N	N/A	N/A	N/A	N/A	N/A	N/A
B15	PEM	Chester	Philadelphia	Southeast	N	CpA	N	N/A	N/A	N/A	N/A	N/A	N/A
B19	PEM	Chester	Philadelphia	Southeast	N	GdC	N	N/A	N/A	N/A	N/A	N/A	N/A
B71	PFO	Chester	Philadelphia	Southeast	N	UudB	N	N/A	N/A	N/A	N/A	N/A	N/A
BB29	PSS	Chester	Philadelphia	Southeast	N	Th	N	N/A	N/A	N/A	N/A	N/A	N/A
C33	PEM	Chester	Philadelphia	Southeast	N	CpA	N	N/A	N/A	N/A	N/A	N/A	N/A
C34	PEM	Chester	Philadelphia	Southeast	N	CpA	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Clay loam
C35	PEM	Chester	Philadelphia	Southeast	N	CpA	N	N/A	N/A	N/A	N/A	N/A	N/A
C37	PEM, PSS, PFO	Chester	Philadelphia	Southeast	N	GeD/CpA	N	N/A	N/A	N/A	N/A	N/A	N/A
C38	PEM	Chester	Philadelphia	Southeast	N	CpB	N	N/A	N/A	N/A	N/A	N/A	N/A
C40	PEM	Chester	Philadelphia	Southeast	N	Co	N	N/A	N/A	N/A	N/A	N/A	N/A
C42	PEM	Chester	Philadelphia	Southeast	N	CaB	N	N/A	N/A	N/A	N/A	N/A	N/A

Table 1. RESTRICTIVE LAYER AND FRAGIPAN ANALYSIS
PENNSYLVANIA PIPELINE PROJECT

Label	Cowardin[1]	County	USACE District	PADEP Region	Functions & Values Fragipan Rationale Utilized (Y/N)[2]	NRCS Mapped Soil Unit[3]	Soil Unit Location Containing Fragipan Likelihood (Y/N)[4]	Examination Depth (in.)[5]	Restrictive Layer Present (Y/N)[6]	Refusal Layer Present (Y/N)	Refusal Depth (in.)[7]	Refusal Layer[8]	Soil Profile Description[9]
C43	PEM, PFO	Chester	Philadelphia	Southeast	N	CpA/CaB	N	N/A	N/A	N/A	N/A	N/A	N/A
C44	PEM	Chester	Philadelphia	Southeast	N	CpB	N	3	N	Y	3	Gravel	0-3" Gravelly clay loam
C47	PEM	Chester	Philadelphia	Southeast	N	Co	N	N/A	N/A	N/A	N/A	N/A	N/A
C48	PEM	Chester	Philadelphia	Southeast	N	GdE	N	8	N	Y	8	Refusal-Coarse Fragments	0-8" Muck
C49	PEM	Chester	Philadelphia	Southeast	N	CpA	N	N/A	N/A	N/A	N/A	N/A	N/A
H1	PEM, PFO	Chester	Philadelphia	Southeast	N	CaB/CpA	N	N/A	N/A	N/A	N/A	N/A	N/A
H15	PEM, PFO	Chester	Philadelphia	Southeast	N	GdB	N	12	N	Y	12	Refusal-Coarse Fragments	0-12" Silt loam
H16	PEM	Chester	Philadelphia	Southeast	N	GdC	N	N/A	N/A	N/A	N/A	N/A	N/A
H17	PEM, PFO	Chester	Philadelphia	Southeast	N	CpA	N	N/A	N/A	N/A	N/A	N/A	N/A
K21	PEM	Chester	Philadelphia	Southeast	N	GgB	N	N/A	N/A	N/A	N/A	N/A	N/A
Q75	PFO	Chester	Philadelphia	Southeast	N	Ha	N	N/A	N/A	N/A	N/A	N/A	N/A
Q76	PSS	Chester	Philadelphia	Southeast	N	Ha	N	N/A	N/A	N/A	N/A	N/A	N/A
Q77	PEM	Chester	Philadelphia	Southeast	N	GdB	N	N/A	N/A	N/A	N/A	N/A	N/A
BA5	PFO	Delaware	Philadelphia	Southeast	N	OtA	N	N/A	N/A	N/A	N/A	N/A	N/A
BA6	PFO	Delaware	Philadelphia	Southeast	N	OtA	N	N/A	N/A	N/A	N/A	N/A	N/A
C10	PEM, PSS	Delaware	Philadelphia	Southeast	N	GsB	N	N/A	N/A	N/A	N/A	N/A	N/A
C23	PEM	Delaware	Philadelphia	Southeast	N	We/GeD3	N	N/A	N/A	N/A	N/A	N/A	N/A
H41	PEM, PSS	Delaware	Philadelphia	Southeast	N	GeC2	N	N/A	N/A	N/A	N/A	N/A	N/A
I1	PEM, PFO	Delaware	Philadelphia	Southeast	N	We	N	N/A	N/A	N/A	N/A	N/A	N/A
I16	PEM, PFO	Delaware	Philadelphia	Southeast	N	OtA	N	N/A	N/A	N/A	N/A	N/A	N/A
I5	PEM	Delaware	Philadelphia	Southeast	N	Mc	N	N/A	N/A	N/A	N/A	N/A	N/A

Footnotes:

[1] The Cowardin classification describes the prevelent wetland vegetative commuinty(ies). **PEM**: Palustrine Emergent; **PSS**: Palustrine Schrub-Shrub; **PFO**: Palustrine Forested.

[2] Functions & Values Fragipan Rationale Utilized (Y/N) - A Wetland Functions and Values Assessment was conducted at each wetland intersected by the project. If Rationale #6 "Fragipan, impervious soils, or bedrock does occur in this wetland" was utilized to justify the Groundwater Recharge/Discharge Principal Function/Value this feature recieved a "Y". Wetlands assessed that did not use this rational were given an "N".

[3] The NRCS Mapped Soil Unit Symbol listed indicates the map soil unit in which the test pit for a delineated wetland was located. Soils units listed were not field verified at test pit locations. Full mapped soil unit names and associated soil survey data can be acquired from: Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database. Available online at http://sdmdataaccess.nrcs.usda.gov/. Accessed [10/27/2016].

[4] Soil Unit Location Containing Fragipan Likelihood (Y/N) - All mapped soil units present at wetlands intersected by the proposed Project were querried for the likelihood to possess Fragipans. NRCS mapped soil units that indicated inclusions of Fragipans, as evaluated in the Soil Survey Geographic (SSURGO) Database [in a field labeled "featurekind"], were utilized to query out wetlands that existed within soils known to contain Fragipan situations.

[5] The maximum depth to which the soil profile was examined during wetland delineation investigations.

[6] A restrictive layer is a layer in the soil/substratum profile that could slow or prevent the infiltration of water, potentially resulting in a perched water table. Restrictive layers could include, but are not limited to, consolidated bedrock, fragipans, dense glacial till, layers of silt or substantial clay content, strongly contrasting soil textures (e.g., silt over sand), or cemented layers, such as ortstein.

[7] The depth at which a layer inhibiting the ability to dig deeper was reached. Refusal is not always indicative of a hydrologically restrictive layer (e.g. high gravel/cobble content, dense tree roots).

[8] A desciption of the type of refusal layer.

[9] Soil Profile Description - illustrates the soil textures present within examination depth. Soil profile data derived from the wetland determination forms completed during the wetland delineation investigations.

N/A - Not Applicable; Y - Yes; N - No.

APPENDIX D

PFO AND PSS WETLAND RESTORATION PLANS

PFO / PSS Plantings

Table 2 – Project Impacts to PFO and PSS Wetlands by County

County	Wetland	EV Status	PFO to PFO Temporary Workspace [a] (acre)	PFO to PEM Permanent ROW [b] (acre)	Restored PFO (acre)	Final PFO Conversion (acre)	PSS to PSS Temporary Workspace [c] (acre)	PSS to PSS Permanent ROW [d] (acre)	Restored PSS (acre)	Final PSS Conversion (acre)
Washington	None	-	-	-	-	-	-	-	-	-
Allegheny	None	-	-	-	-	-	-	-	-	-
Westmoreland	BB80	N/A	-	-	-	-	0.005	-	0.005	0.000
	P15	N/A	-	0.017	0.012	0.0Table 05	-	-	-	-
	P33	N/A	-	0.007	0.005	0.002	-	-	-	-
Indiana	N38	N/A	-	-	-	-	-	0.024	0.024	0.000
	O46	EV	-	0.025	0.025	0.000	-	-	-	-
	P2	N/A	-	-	-	-	0.001	-	0.001	0.000
Cambria	BB67	N/A	-	-	-	-	-	0.029	0.029	0.000
	BB142	N/A	-	-	-	-	-	0.010	0.010	0.000
	BB144	N/A	-	-	-	-	-	0.095	0.095	0.000
	CC15	N/A	-	0.007	0.005	0.002	-	-	-	-
	K30	N/A	-	0.010	-	0.010	-	-	-	-
	L63	N/A	-	0.036	-	0.036	-	-	-	-
	L70A	EV	-	0.103	0.029	0.074	-	-	-	-
	M60	N/A	-	-	-	-	-	0.056	0.056	0.000
	M61	N/A	-	-	-	-	-	0.004	0.004	0.000
	N15	N/A	-	0.018	-	0.018	-	-	-	-
	N25	N/A	-	-	-	-	0.007	0.004	0.011	0.000
	N29	EV	-	0.012	-	0.012	-	-	-	-
	O20	EV	-	-	-	-	-	0.042	0.042	0.000
Blair	BB124	EV	-	-	-	-	0.428	0.060	0.488	0.000
	L70B	EV	-	0.019	0.006	0.013	-	-	-	-

County	Wetland	EV Status	PFO to PFO Temporary Workspace [a] (acre)	PFO to PEM Permanent ROW [b] (acre)	Restored PFO (acre)	Final PFO Conversion (acre)	PSS to PSS Temporary Workspace [c] (acre)	PSS to PSS Permanent ROW [d] (acre)	Restored PSS (acre)	Final PSS Conversion (acre)
	Q57	EV	-	0.006	-	0.006	-	-	-	-
Huntingdon	BB127	N/A	-	0.015	-	0.015	-	0.029	0.029	0.000
	CC28	N/A	-	0.042	0.011	0.031	-	-	-	-
	L36	N/A	-	-	-	-	-	0.030	0.030	0.000
	M3	N/A	-	-	-	-	-	0.007	0.007	0.000
	Y9	N/A	0.011	-	0.011	0.000	-	-	-	-
Juniata	None	-	-	-	-	-	-	-	-	-
Perry	W25e	EV	-	-	-		-	0.058	0.058	0.000
	W26e	EV	-	0.097	0.063	0.034	-	-	-	-
	K52	EV	-	-	-	-	-	0.008	0.008	0.000
Cumberland	BB155	N/A	-	-	-	-	-	0.019	0.019	0.000
	I38	EV	-	0.070	-	0.070	-	-	-	-
	J13	EV	-	-	-	-	-	0.001	0.001	0.000
York	J63	N/A	-	0.004	-	0.004	-	-	-	-
Dauphin	B61	N/A	-	0.051	0.047	0.004	-	-	-	-
	B64	N/A	-	0.042	0.017	0.025	-	-	-	-
	B76	N/A	-	-	-	-	-	0.059	0.059	0.000
	C27	N/A	-	-	-	-	-	0.031	0.031	0.000
Lebanon	C16	N/A	-	0.029	0.029	0.001	-	-	-	-
	C17	N/A	-	0.025	0.010	0.015	-	-	-	-
Lancaster	None	-								
Berks	B49	N/A	-	-	-	-	-	0.018	0.018	0.000
Chester	H15	N/A	-	0.047	0.019	0.029	-	-	-	-
Delaware	None	-	-	-	-	-	-	-	-	-

County	Wetland	EV Status	PFO to PFO Temporary Workspace [a] (acre)	PFO to PEM Permanent ROW [b] (acre)	Restored PFO (acre)	Final PFO Conversion (acre)	PSS to PSS Temporary Workspace [c] (acre)	PSS to PSS Permanent ROW [d] (acre)	Restored PSS (acre)	Final PSS Conversion (acre)
TOTAL			0.011	0.682	0.288	0.405	0.441	0.584	1.025	0.000

a – PFO impacts within temporary workspace will be replanted with native wetland tree species.

b – PFO impacts within permanent ROW will only be replanted with woody species up to ten feet from the pipeline, the remaining area will be allowed to revert to PEM.

c – PSS impacts within temporary workspace will be replanted with native wetland shrub species.

d – PSS impacts within permanent ROW will be replanted with native wetland shrub species.

*Wetland L70 is split between Cambria and Blair counties, L70A is located in Cambria and L70B is the portion located in Blair County.

Table 3. Ernst FACW Meadow Mix (ERNMX-122) for Wetland Seeding

Scientific Name	Common Name	Percentage of Mix
Carex vulpinoidea	Fox Sedge	31%
Elymus virginicus	Virginia Wildrye	20%
Carex lurida	Lurid	14%
Scipus atrovirens	Green Bulrush	5%
Verbena hastate	Blue Vervain	4%
Cinna arundinacea	Wood Reedgrass	3.5%
Juncus effuses	Soft Rush	3%
Carex scoparia	Blunt Broom Sedge	3%
Carex luputina	Hop Sedge	3%
Onoclea sensibilis	Sensitive Fern	2%
Heliopsis helianthoides	Oxeye Sunflower	2%
Glyceria Canadensis	Rattlesnake Grass	1%
Scirpus cyperinus	Woolgrass	1%
Asclepias incarnata	Swamp Milkweed	1%
Aster novae-angliae (Symphyotrichum n.)	New England Aster	1%
Aster umbellatus (Doellingeria umbellate)	Flat Topped White Aster	1%
Eupatorium fistulosum	Joe Pye Weed	0.5%
Eupatorium perfoliatum	Boneset	0.5%
Penthorum sedoides	Ditch Stonecrop	0.5%
Sisyrinchlum angustifolium	Narrowleaf Blue Eyed Grass	0.5%
Ludwigia alternifolia	Seedbox	0.5%
Lobelia siphilitica	Great Blue Lobelia	0.5%
Alisma subcordatum (A. plantago-aquatica)	Mud Plantain (Water Plantain)	0.5%
Mimulus ringens	Square Stemmed Monkeyflower	0.5%
Carex intumescens	Bladder (Star) Sedge	0.4%
Pycnanthemum tenuifolium	Slender Mountain Mint	0.1%
	TOTAL	**100%**

Seeding Rate: 20 lbs per acre, or ½ lb per 1,000 sq ft

Table 4. Seedling Species and Typical Planting Specifications for PFO/PSS Wetland Areas

Vegetation Planting Type	Size	Species [a]		Wetland Status [b]
Shrub Species	Two to three-foot whip	*Alnus serrulata*	Smooth Alder	OBL
		Cornus amomum	Silky Dogwood	FACW
		Lindera benzoin	Spicebush	FAC
		Viburnum dentatum	Northern arrow-wood	FAC
Tree Species	Containerized (1-inch DBH)	*Acer rubrum*	Red maple	FAC
		Betula alleghaniensis	Yellow Birch	FAC
		Platanus occidentalis	American Sycamore	FACW
		Quercus bicolor	Swamp White Oak	FACW
		Salix nigra	Black Willow	OBL

a – If the listed species is unavailable during planting, a comparable native substitute will be used.
b - USACE Eastern Mountains and Piedmont Wetland Status.

PFO / PSS Plantings

Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
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- PSS Temporary Impacts to Replant
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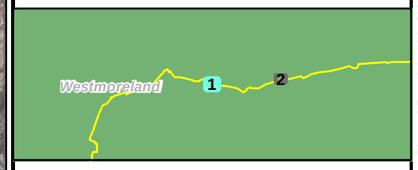
- County Boundary



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1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Westmoreland County, PA.
1 of 37

Prepared By: TETRA TECH

Date: 11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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Legend

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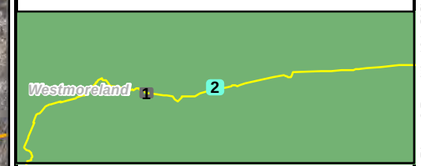

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Westmoreland County, PA.
2 of 37

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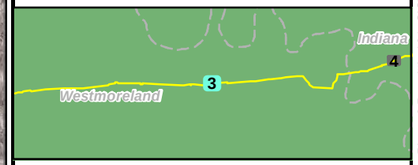

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Westmoreland County, PA.
3 of 37

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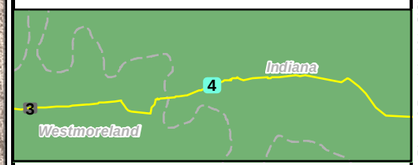

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Indiana County, PA.
4 of 37

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Indiana County, PA.
5 of 37

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Indiana County, PA.
6 of 37

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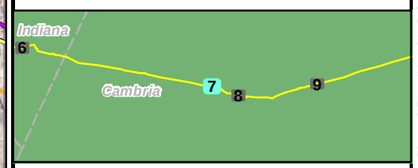

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
7 of 37

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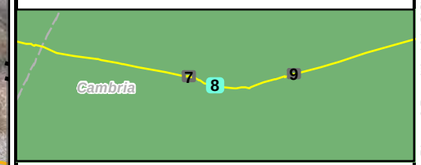

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
8 of 37

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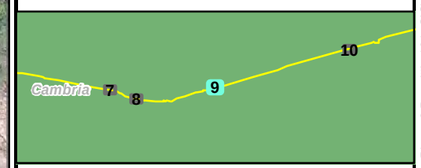

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
9 of 37

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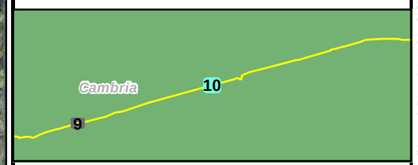

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
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Prepared By: TETRA TECH

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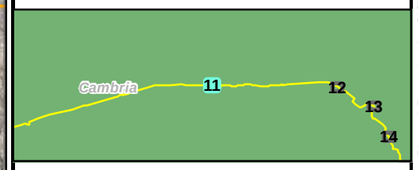

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
11 of 37

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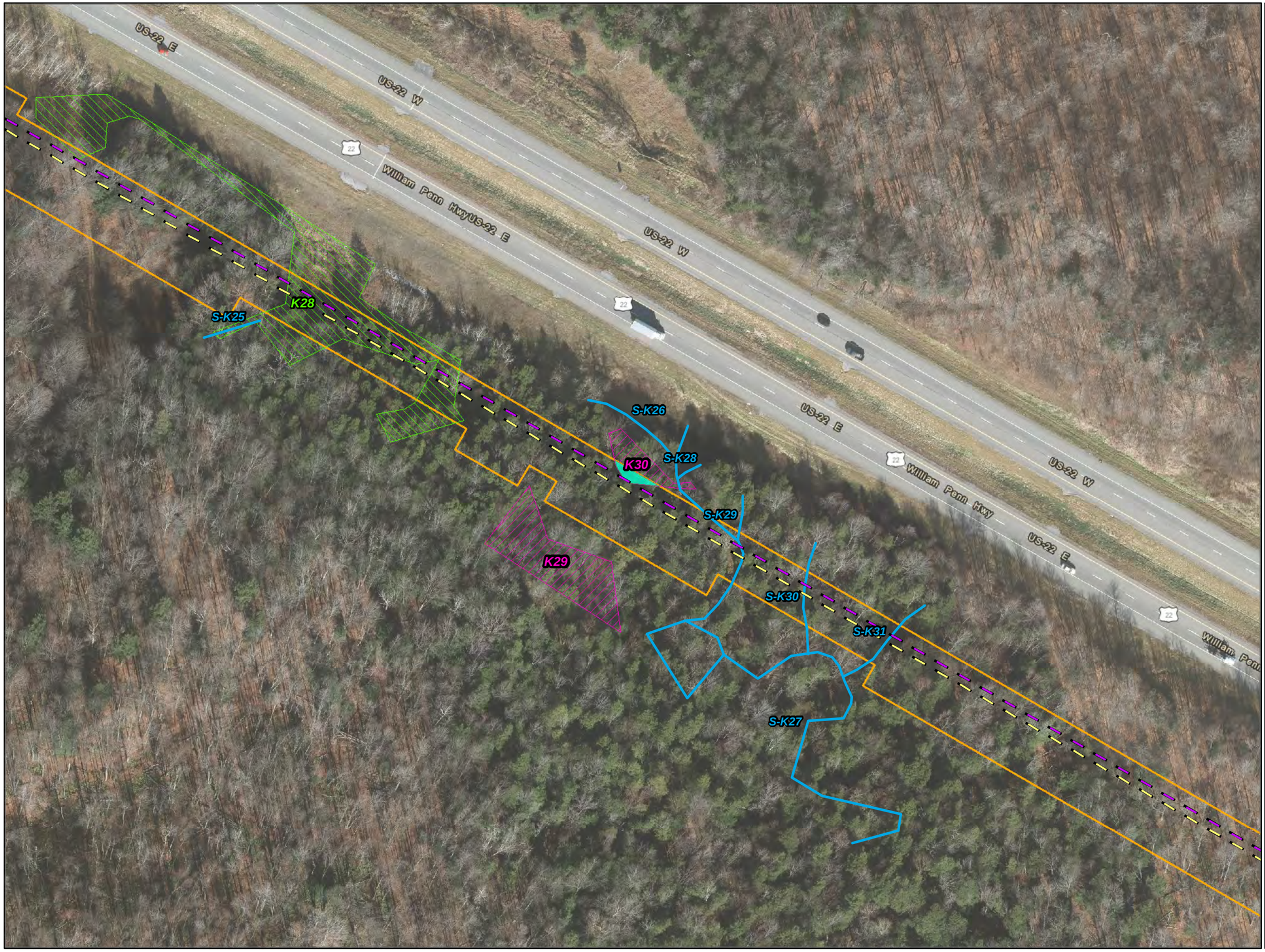

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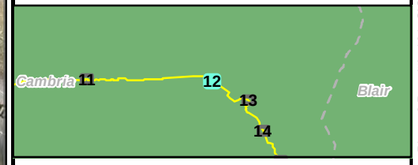

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
12 of 37

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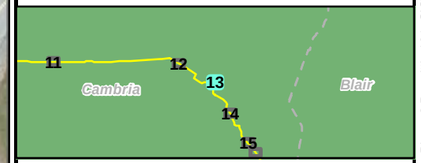

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
13 of 37

Prepared By:	Date:
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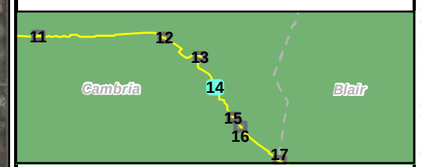

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
14 of 37

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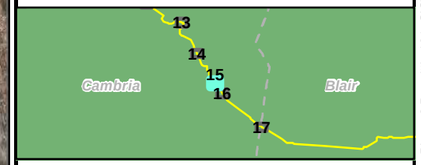

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
15 of 37

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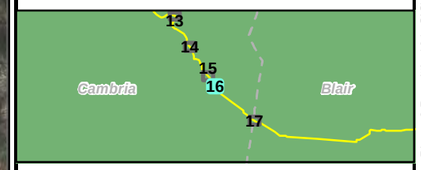

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cambria County, PA.
16 of 37

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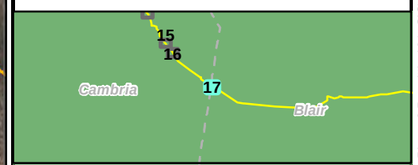

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Blair County, PA.
17 of 37

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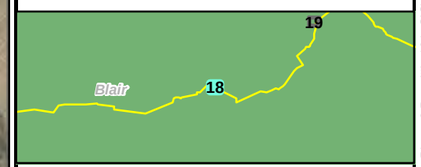

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Blair County, PA.
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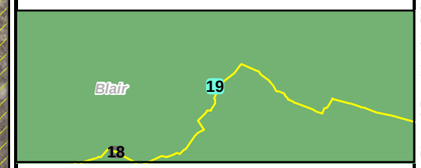

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Blair County, PA.
19 of 37

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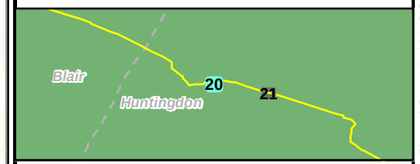

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Planting Maps for the Sunoco Pennsylvania Pipeline Project, Huntingdon County, PA.
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Coordinate System: NAD 83 Stateplane, PA South, Feet

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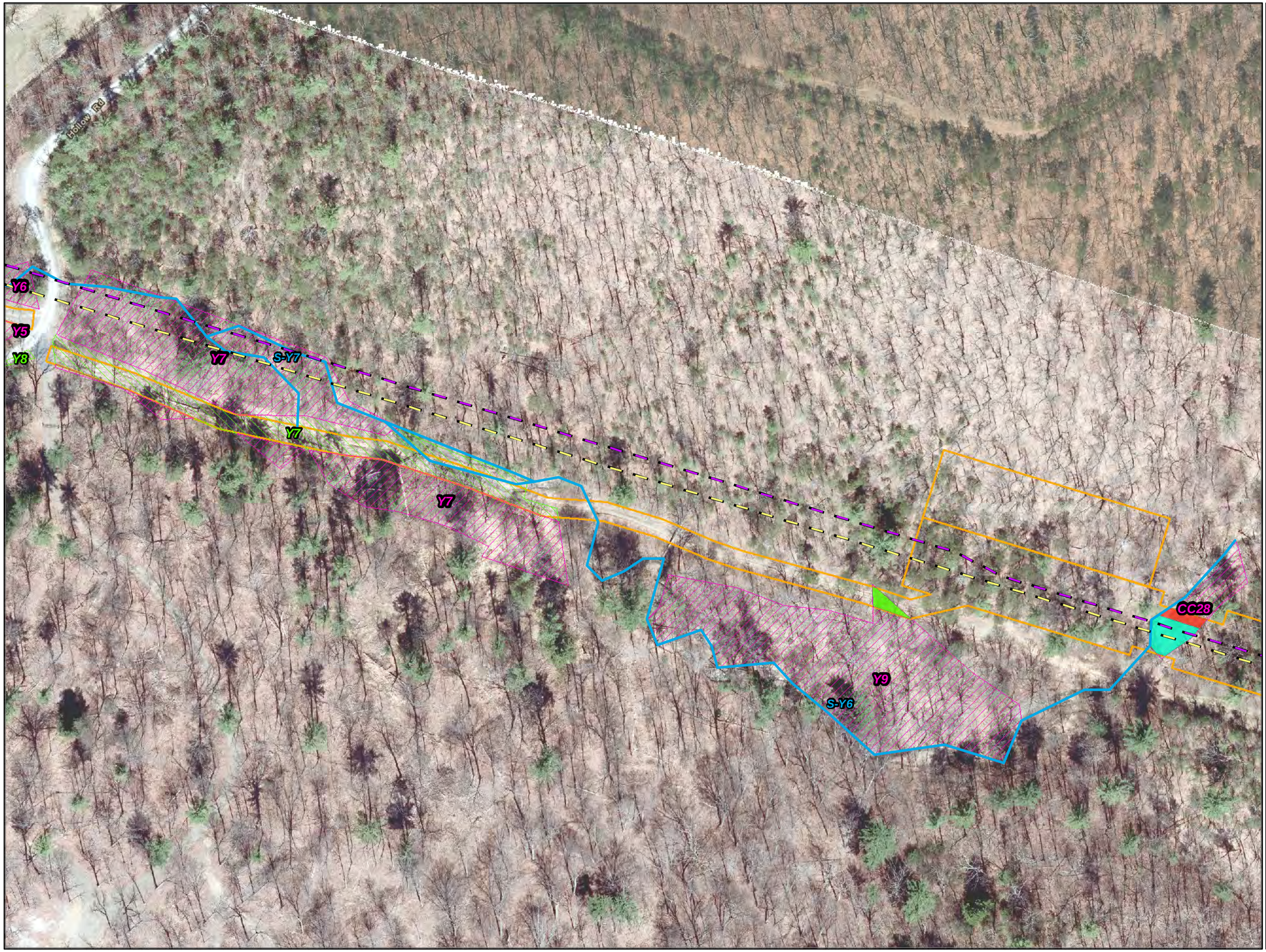
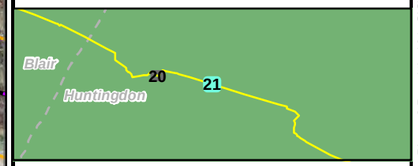


Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary



0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Huntingdon County, PA.
21 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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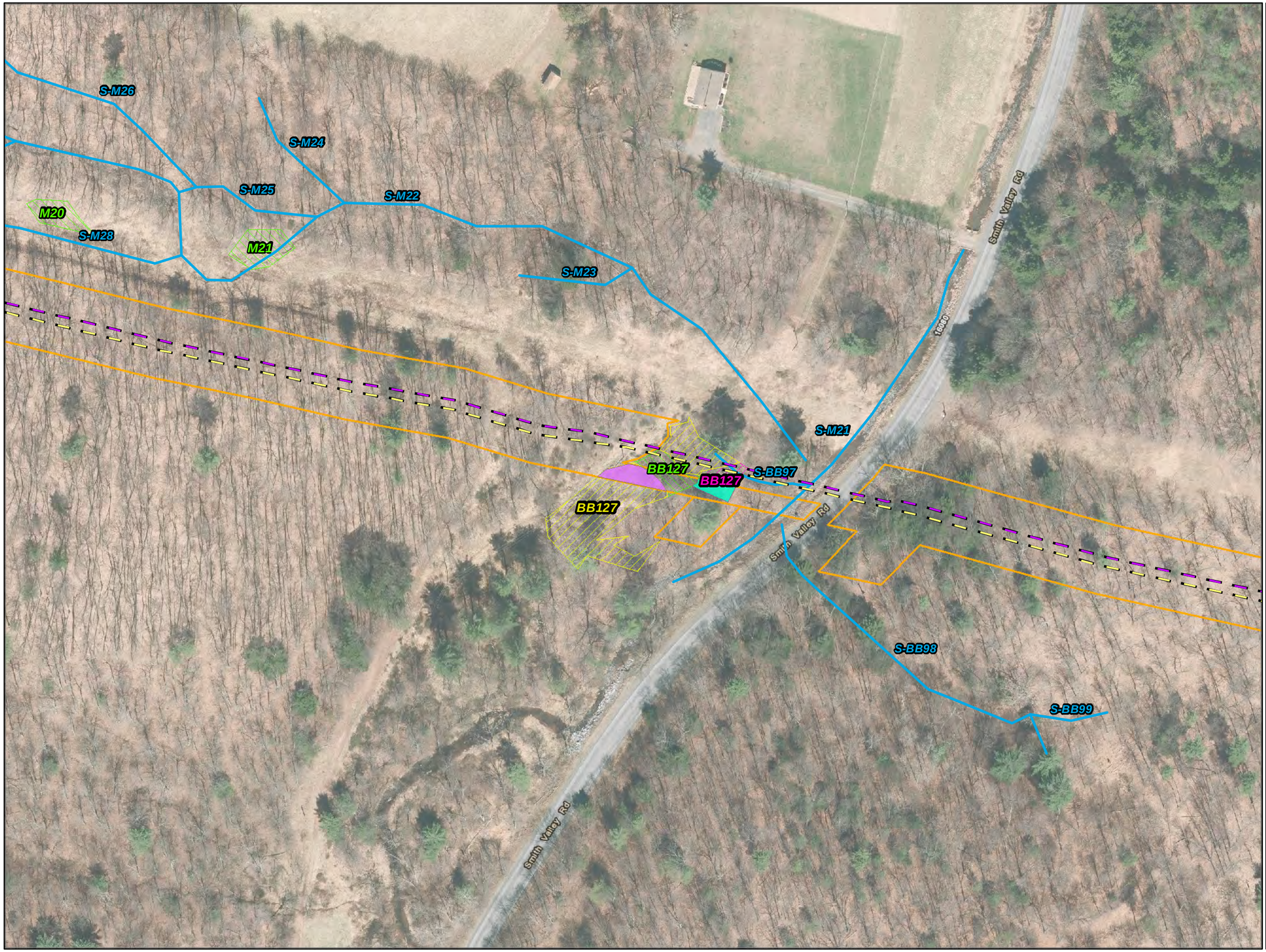
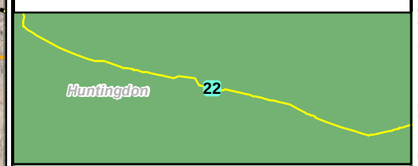


Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary



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0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Huntingdon County, PA.
22 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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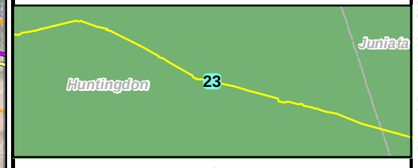
Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary



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0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Huntingdon County, PA.
23 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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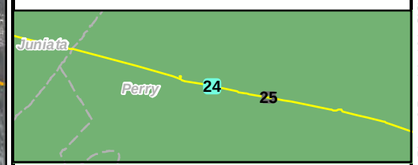
Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary



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0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Perry County, PA.
24 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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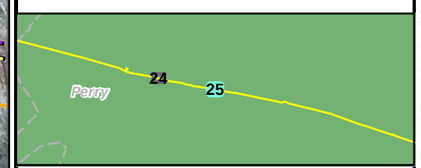
Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary



N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Perry County, PA.
25 of 37

Prepared By: TETRA TECH

Date: 11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
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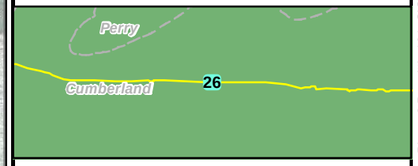
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary



N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cumberland County, PA.
26 of 37

Prepared By: TETRA TECH

Date: 11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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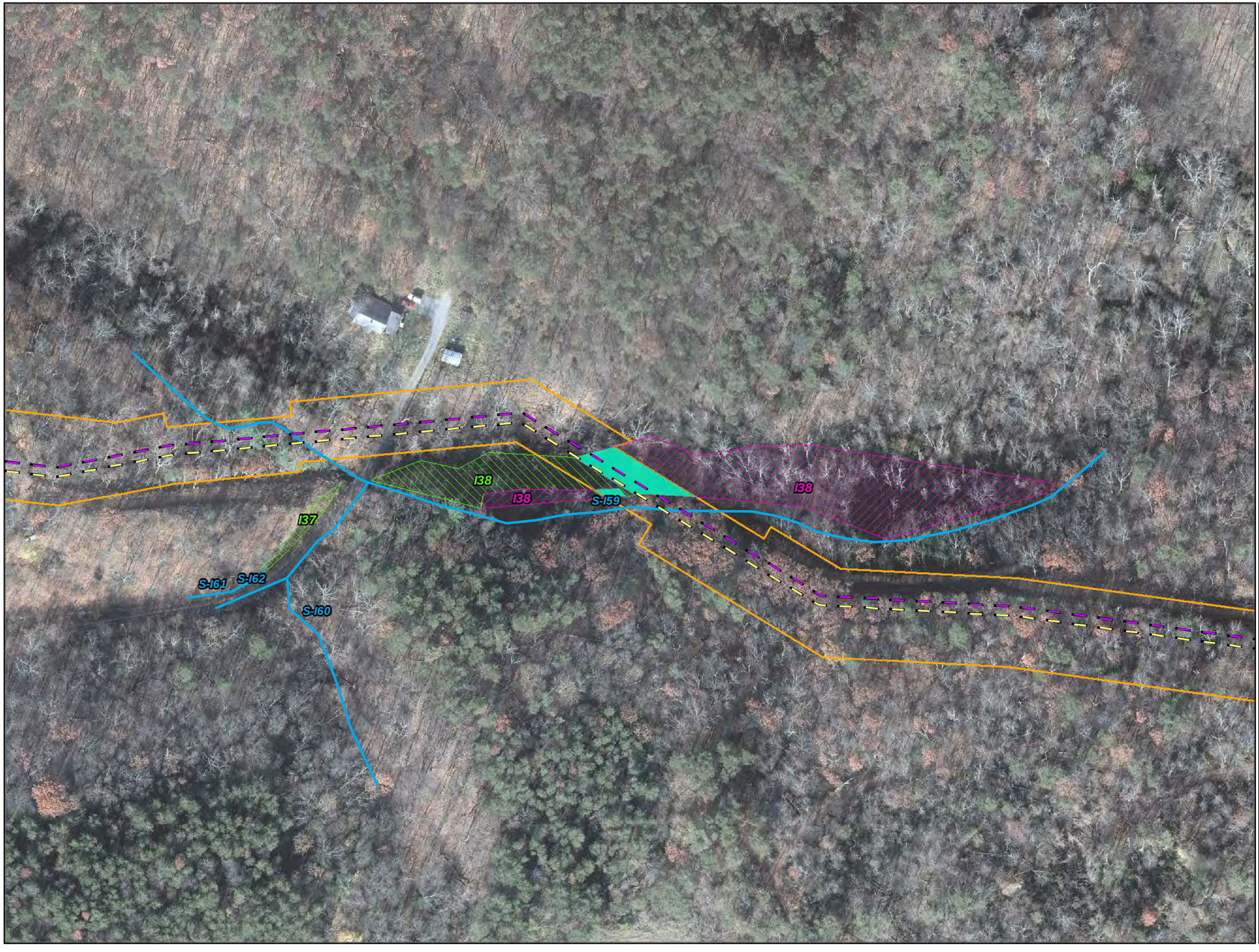

Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
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- PSS Temporary Impacts to Replant
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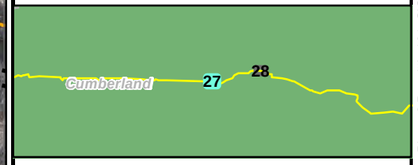
- County Boundary



N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cumberland County, PA.
27 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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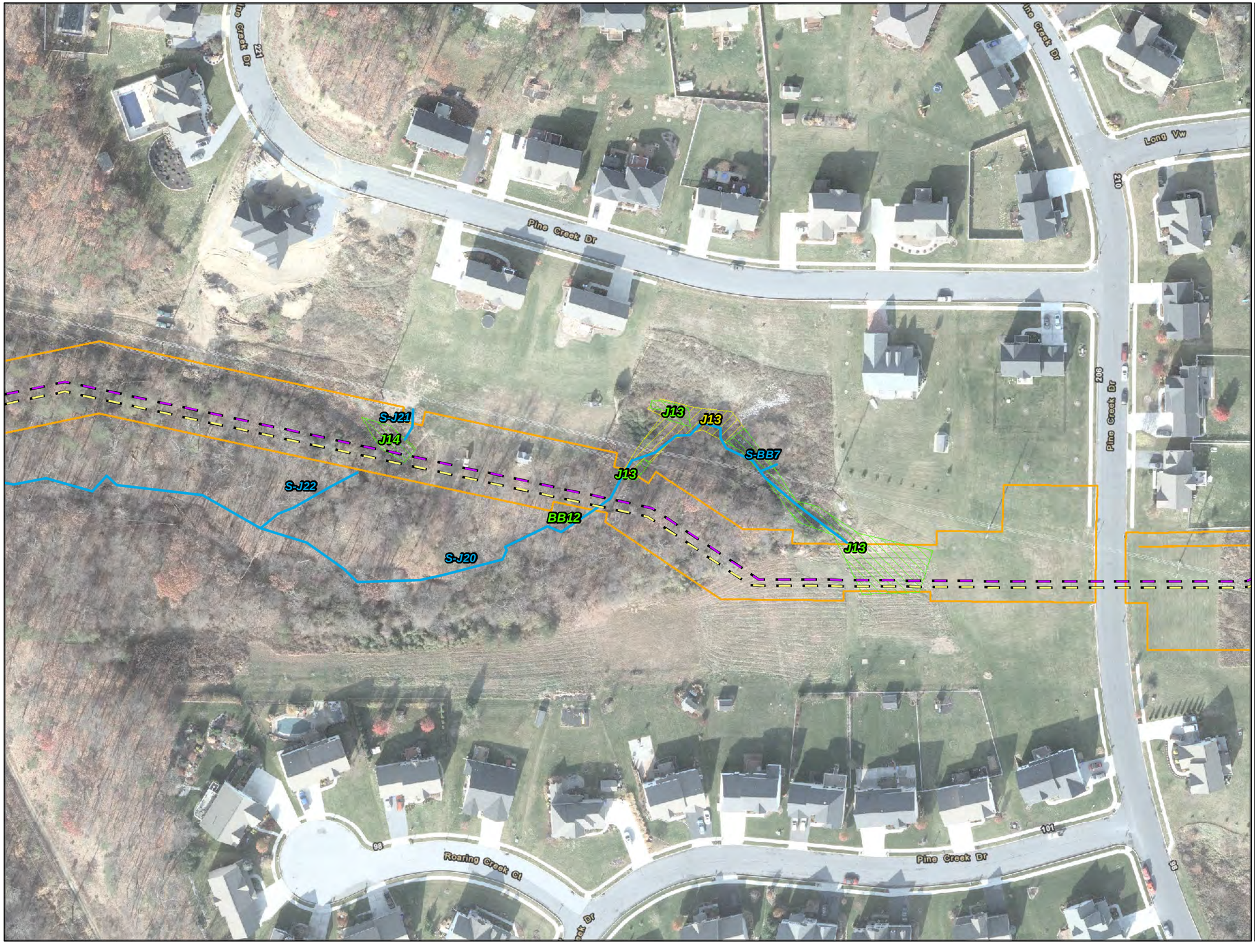

Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary

N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Cumberland County, PA.
28 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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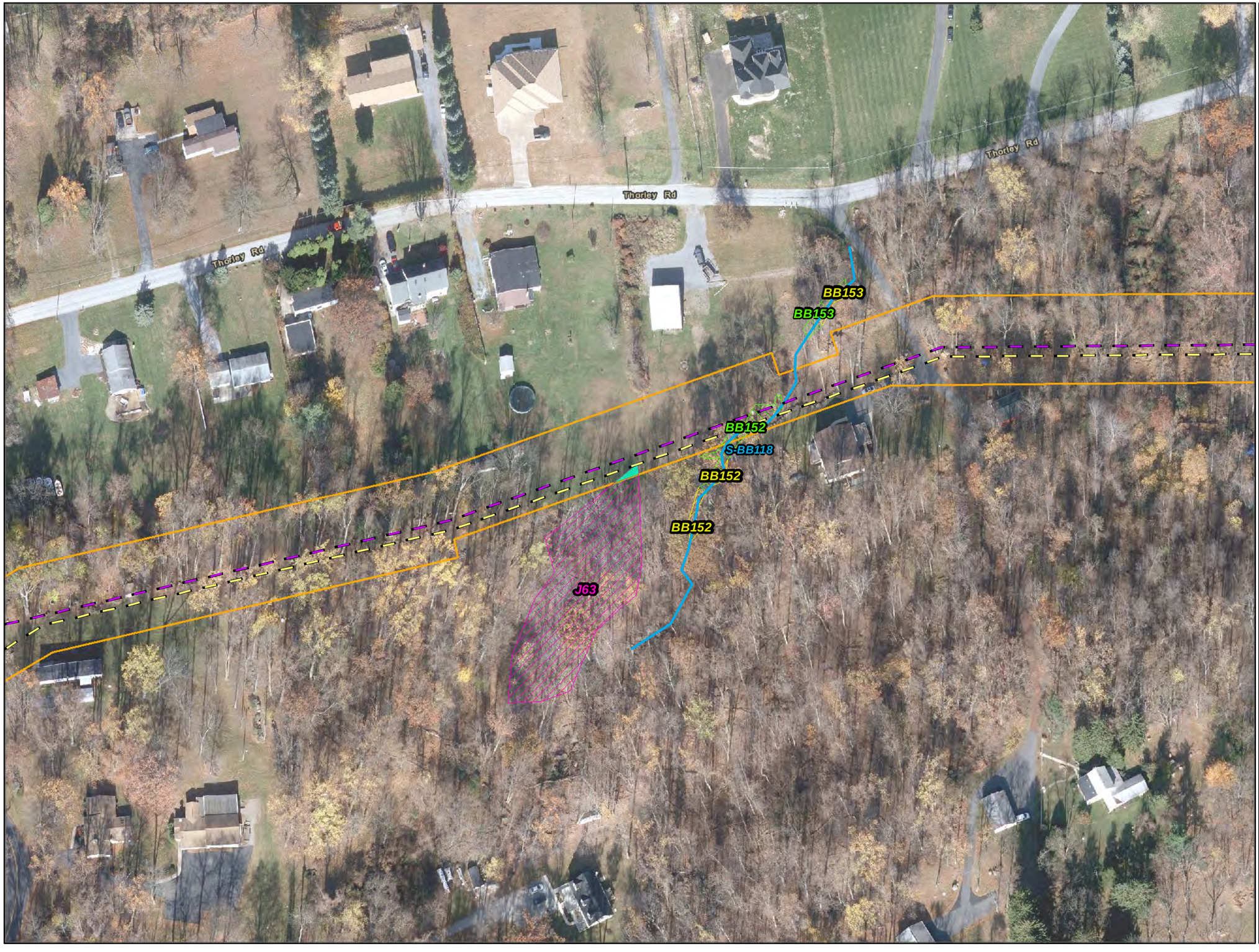

Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
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- PSS Temporary Impacts to Replant
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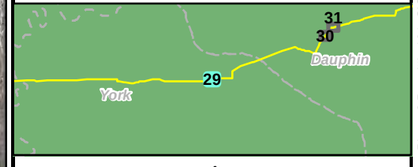
- County Boundary



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0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, York County, PA.
29 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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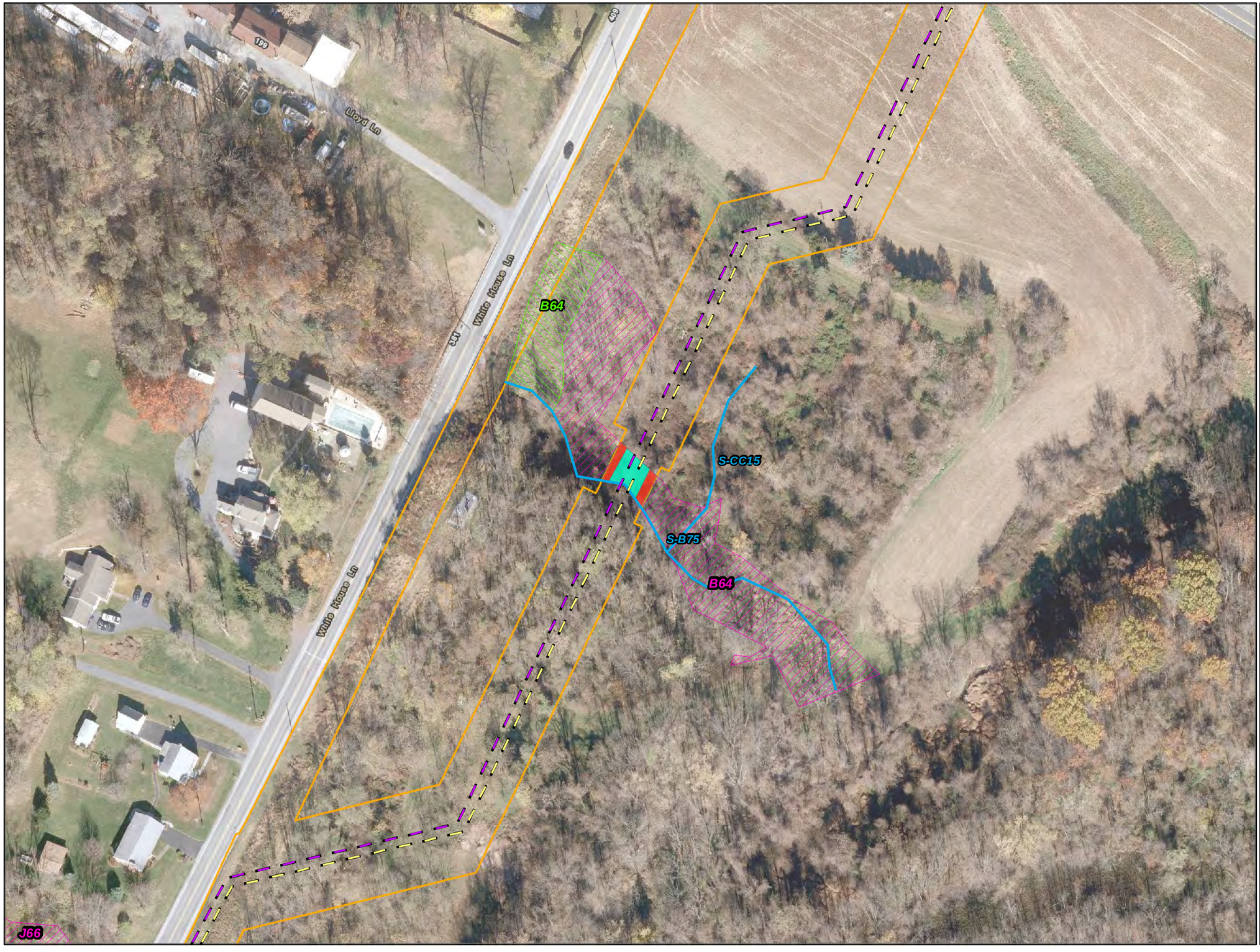
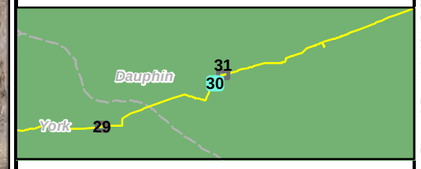


Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary



N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Dauphin County, PA.
30 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
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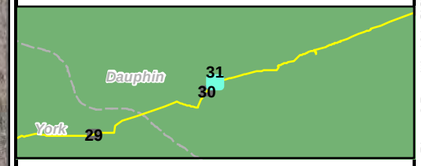
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary



N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Dauphin County, PA.
31 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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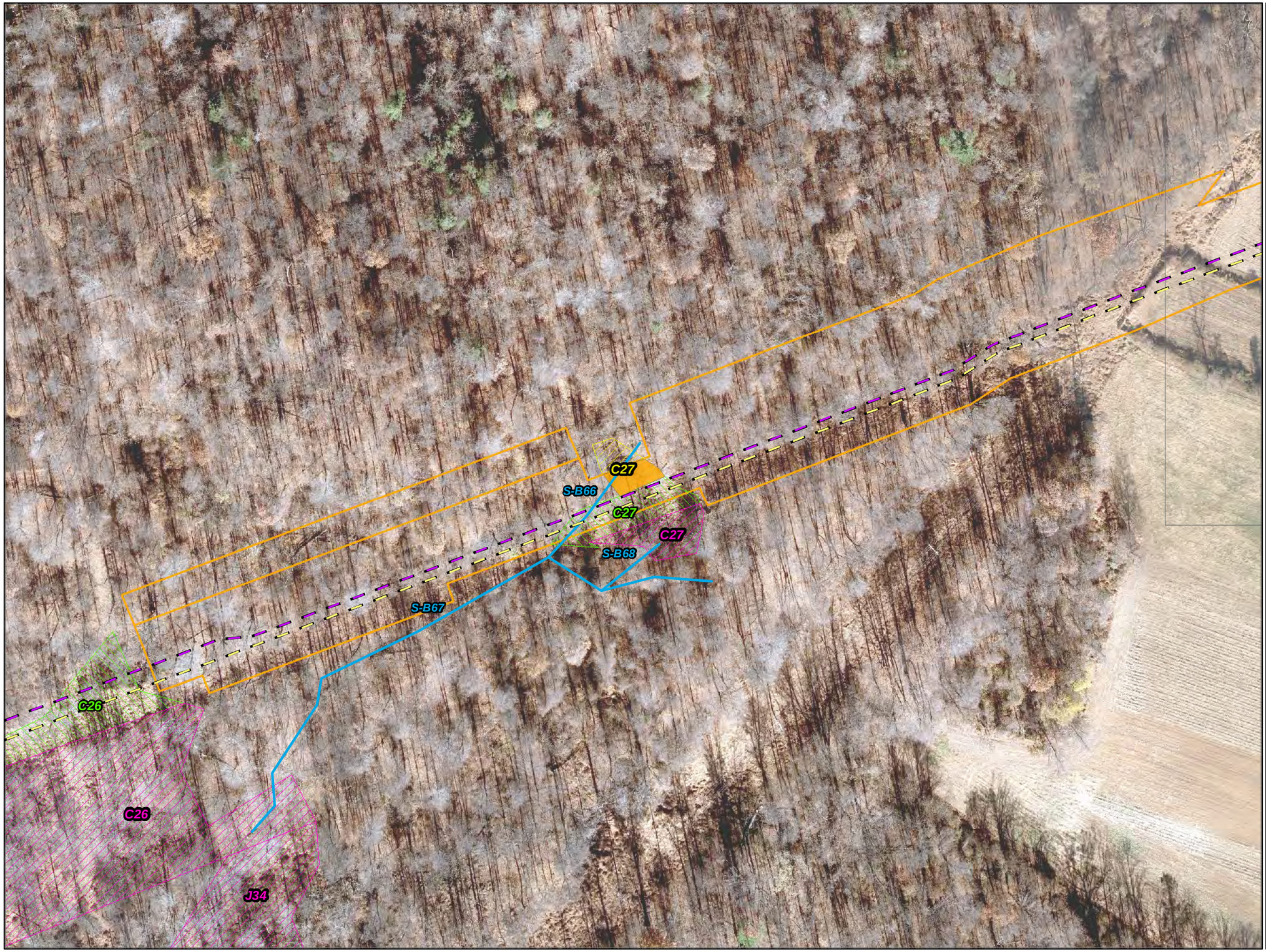
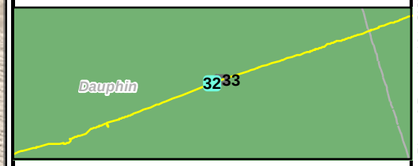


Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary



N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Dauphin County, PA.
32 of 37

Prepared By: TETRA TECH

Date: 11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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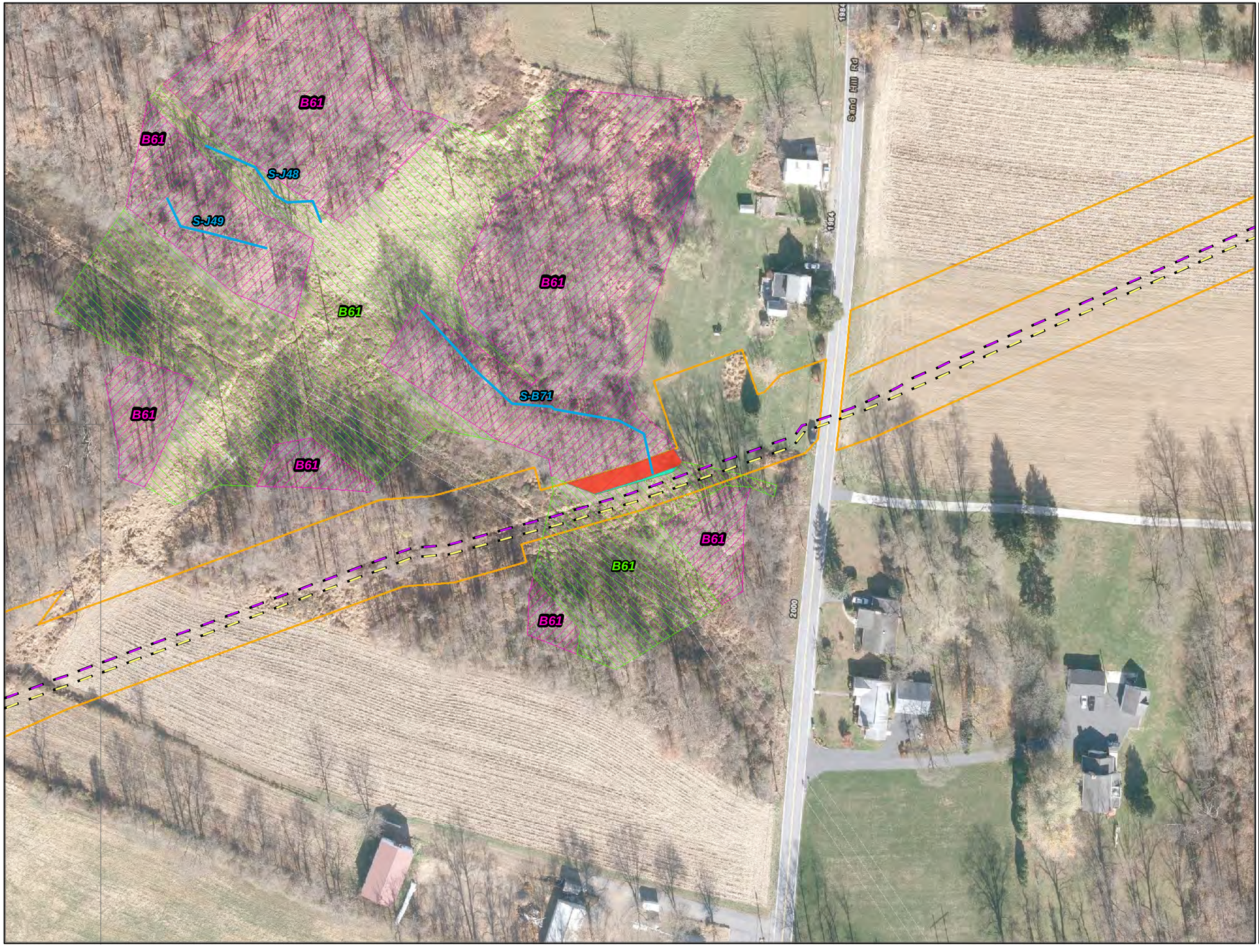

Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
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- PSS Wetland
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- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary

N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Dauphin County, PA.
33 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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Legend

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- 16" PPP Centerline
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- PSS Wetland
- PFO Permanent Impacts to Replant
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- Sheet Boundary
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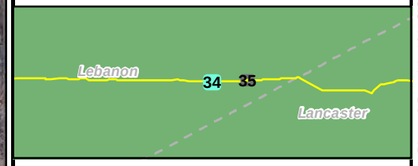

N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Lebanon County, PA.
34 of 37

Prepared By: TETRA TECH

Date: 11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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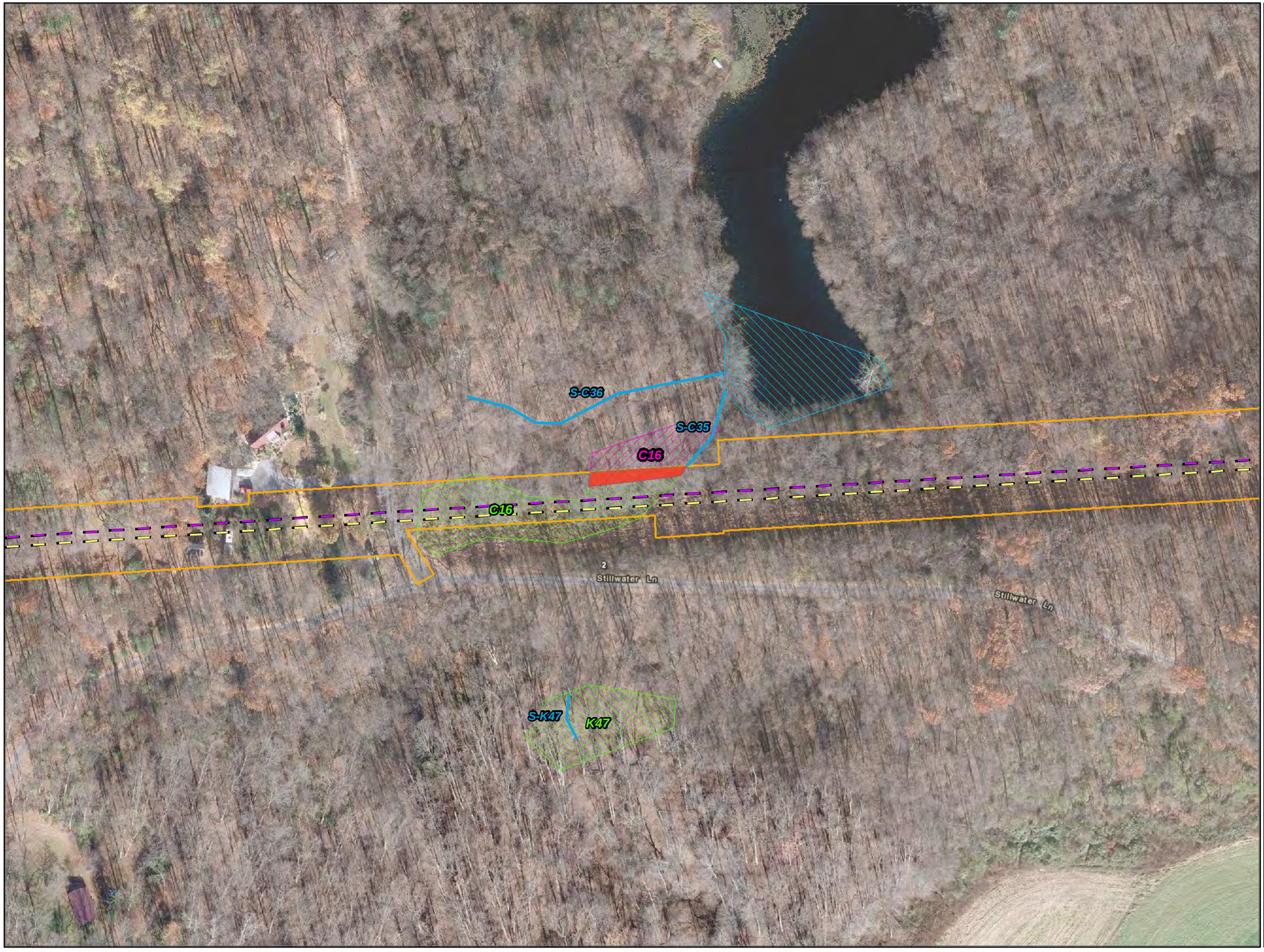

Legend

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- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
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- PSS Temporary Impacts to Replant
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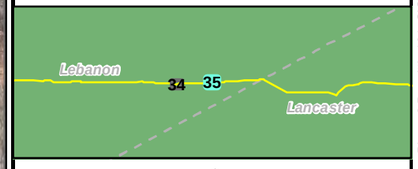
- County Boundary



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0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Lebanon County, PA.
35 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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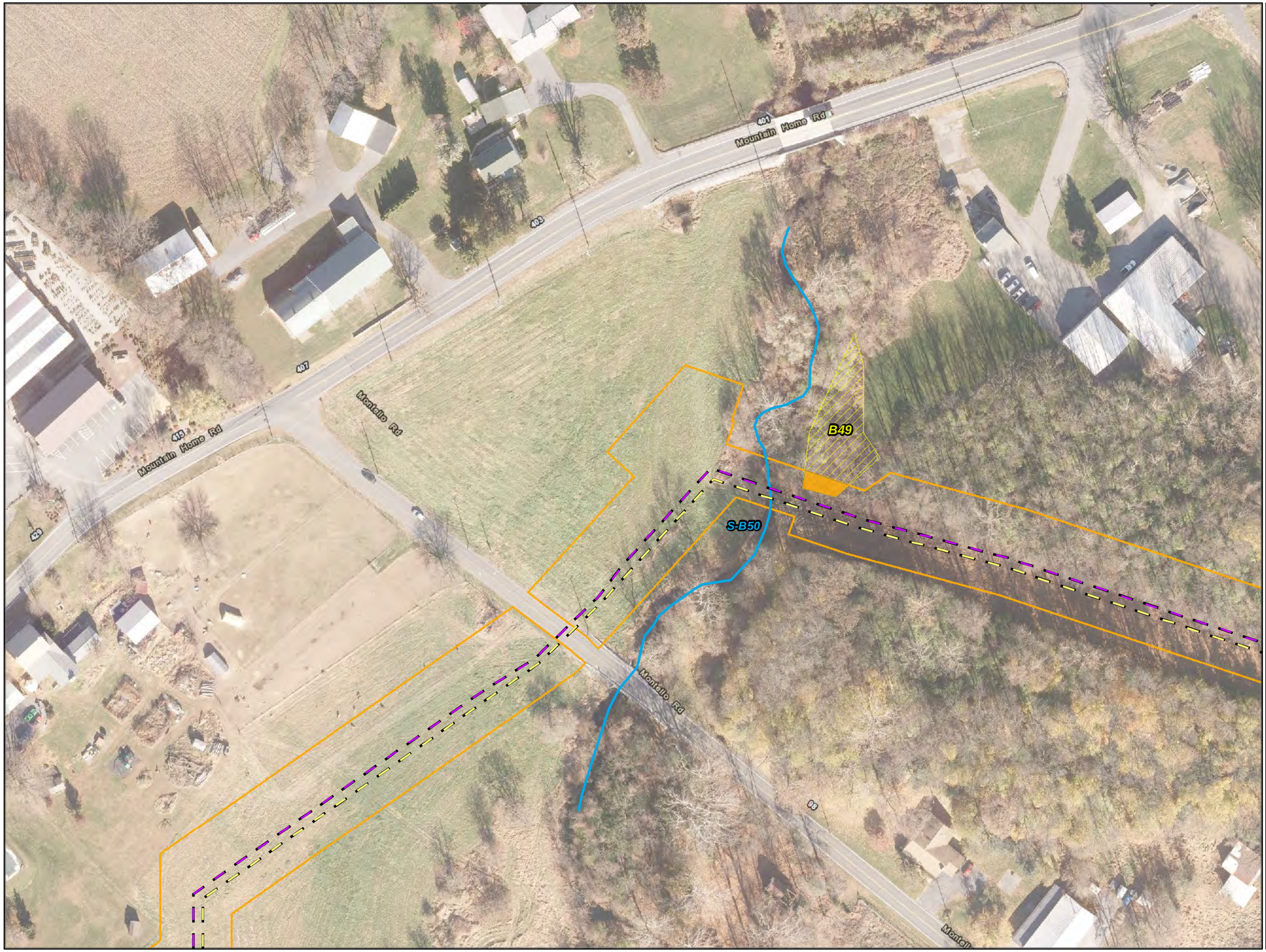

Legend

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- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary

N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Berks County, PA.
36 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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Legend

- 20" PPP Centerline
- 16" PPP Centerline
- PPP Workspace
- Streams
- Ponds
- PEM Wetland
- PFO Wetland
- PSS Wetland
- PFO Permanent Impacts to Replant
- PFO Temporary Impacts to Replant
- PFO to PEM Conversion
- PSS Permanent Impacts to Replant
- PSS Temporary Impacts to Replant
- Sheet Boundary
- County Boundary

N

0 100 200 Feet

1 inch = 100 feet

Planting Maps for the Sunoco Pennsylvania Pipeline Project, Chester County, PA.
37 of 37

Prepared By:	Date:
TETRA TECH	11/2016

Coordinate System: NAD 83 Stateplane, PA South, Feet

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