TETRA TECH

June 22, 2020

Mr. John Hohenstein, P.E.
Environmental Program Manager
Pennsylvania Department of Environmental Protection
Waterways and Wetlands Program
Southeast Regional Office
2 East Main Street
Norristown, PA 19401-4915

Re: Sunoco Pipeline L.P. – Pennsylvania Pipeline Project (Mariner East II)
DEP File No. E23-524
Technical Deficiency Response
Major Modification – Installation Method Change at 0620 HDD
APS No. 879056, AUTH ID 1087492
Middle Township
Delaware County

Dear Mr. Hohenstein:

On behalf of Sunoco Pipeline LP (SPLP), Tetra Tech, Inc. provides the following responses to the Pennsylvania Department of Environmental Protection (Department) Technical Deficiency letter dated May 27, 2020. The supporting attachments represent additional information to be added to the original modification request. For ease of your review, each Department comment is set forth verbatim below, followed by a narrative response with supporting attachments where necessary.

Comments and Responses to May 27, 2020 Technical Deficiency Letter Regarding "April 2020 Technical Deficiency Comments of March 25, 2019, Amendment Request".

***Technical Deficiencies Responses/Comments*:**

1. Wetland WL- I1 was classified as an exceptional value (EV) wetland by Tetra Tech (TT) based on the wetland's location of 0.5 mile upstream of the Aqua PA Chester Creek intake. 25 Pa. Code § 105.17(1) defines five factors, one being along an existing public or private water supply that maintain the quality and quantity of the water supply. Any one of the five factors classify a wetland as "Exceptional Value" (EV). The other four EV criteria (such as wild trout reproduction or threatened and endangered species habitat) are not met by the wetland (*see* 25 Pa. Code § 105.17(1). TT based its EV wetland classification on the location relative to an existing public drinking water intake, *see* 25 Pa. Code § 105.17(1)(iv). Due to the distance between the wetland and the water intake, it appears that the wetland is not maintaining the quality and quantity of the downstream drinking water supply. As such, WL-I1 is more appropriately correctly classified as an "Other wetlands" as defined in 25 Pa. Code § 105.17(2).

Response: Thank you for the clarification. The following permit modification attachments have been modified (redlined) to reflect the change in classification of wetland WL-I1 from EV to "other" and are included in **Attachment I** of this response:

- *Attachment A – Project Description/Alternatives Analysis*
- *Attachment C – Environmental Assessment*
- *Attachment E – Site Plan and Aquatic Resource Impact Table*

2. The size-area of the PEM portion of WL-I1 is a total of 0.49 acre; the eastern PFO portion is 0.62 acre and the western PFO potion is 0.24 acre. Based on review of the submitted site plans, the width of the PEM portion of the wetland within the Limits of Mr. Mathew Gordon - 2 - May 27, 2020 Disturbance (LOD) ranges from approximately 60 ft to 110 ft. The PFO portions of the wetland

Tetra Tech, Inc.
661 Andersen Drive, Pittsburgh, PA 15220
Tel 412.921.7090 Fax 412.921.40404 www.tetratech.com

immediately abuts the PEM portion. TT states that there will be no impacts to the PFO portions and requests increasing the width of the LOD from 50 feet to 110 feet due to "hot lines" in the work area. If the LOD is widened, then it appears that impacts will occur to one or both of the PFO portions of WL-I1. Address this issue, including an explanation of the "hot lines" and associated safety issues and fully explain the reasons why the width of the LOD should be extended.

Response: The impact width will be a maximum of approximately 110 feet. Where the area between the western and eastern PFO areas narrows, the impact also narrows to 60 feet and remains within the PEM wetland classification. This irregular shape of the impact is depicted on the E&S Plan sheet ES-6.20 included as *Attachment D* of the permit modification application and included in **Attachment II** of this response.

The 16-inch and 20-inch lines through this area will be installed simultaneously within a single ditch. Three hot lines parallel the proposed lines, an existing 8-inch line to northwest and 12- and 14-inch lines to the southwest. The presence of these hot lines limits the workspace for the travel lane and trenching, therefore the additional workspace in the area southwest of the travel lane is required to complete the work (see ES-6.20). Travel with heavy equipment on hotlines is discouraged and to be avoided whenever possible. However, spoil stock piling is allowable. This design keeps the travel lane off the hotlines, minimizes the construction duration, reduces the distance trench spoils are moved, and will ensure proper topsoil and subsoil segregation.

3. An Alternatives Analysis (AA) submitted in support of the proposed amendment is very brief and lacks sufficient details. An AA must assess the impacts to wetlands as stated and meet all the conditions in 25 Pa. Code § 105.18a(b)(1) through (7). Alternatives such as utilization of a boring method (other than HDD) under the stream and wetland, and other impact avoidance and minimization measures, must be fully assessed. Boring is being proposed for two street crossings and one railroad crossing. You need to explain why boring cannot be used to cross wetlands and streams.

Response: A revised Alternatives Analysis (AA) is provided in **Attachment I** of this response: *Attachment A – Project Description/Alternatives Analysis*. The revised AA fully assesses the use of boring methods (other than HDD) under the subject stream and wetland and demonstrates why these methods are neither technically feasible nor practicable taking into consideration existing technology, logistics, and safety; fully assesses other impact avoidance and minimization measures; and demonstrates impacts to wetland WL-I1 are in compliance will all applicable conditions in 25 Pa. Code § 105.18(b)(1) through (7).

4. The amendment submittal refers to direct and indirect impacts as "minor" and "temporary." It is questionable whether the impacts are minor due to the number and nature of impacts to date. The degree and numerous impacts to the wetlands may have altered the hydrology of the wetland to a degree that it cannot be restored. An valuation of whether the wetland can be restored, including a hydrology assessment, needs to be conducted. If it is found to be unlikely that suitable hydrology can be restored, then off-site options will need to be evaluated. A study plan needs to be prepared in accordance with this comment, and other relevant comments regarding the hydrology in the August 2018 comments, and submitted to DEP for review.

Response: Wetland I1's (WL-I1) natural hydrology is supported by several different hydrologic sources including direct precipitation, surface runoff, groundwater, and occasional flooding from the adjacent creek (Chester Creek). Activities conducted within WL-I1 at this time have been limited to the placement of timber/construction mats, cleanup of inadvertent returns, and restoration of a subsidence area resulting in a temporary disturbance of wetland vegetation and potential soil compaction. There has been no impact or alteration to the wetland's overall soil composition or profile, and the hydrologic sources remain constant over time. In addition, a hydrologic assessment of WL-I1 was conducted the week of June 8, 2020. Specifically, 5 soil test pits dug to a depth of 12 inches in WL-I1 exhibited hydrologic wetland indicators in all locations: 2 test pits located under the timber mats (mats were moved to allow testing) had saturated soils and filled with water to a depth of 10 inches below surface, 1 test pit located on the proposed centerline of the open cut had saturated soils and filled with water to a depth of 2 inches below surface, 1 test pit located near the repaired subsidence area had saturated soils and filled with water to a depth of 2 inches below

surface, and another test pit located off the existing ROW in the PFO portion of the wetland had saturated soils and filled with water to a depth of 2 inches below surface.

Based on current field observations and results of the recent on-site hydrologic assessment, "the degree and numerous impacts to the wetland" have not altered the hydrology of the WL-I1. In addition, the proposed installation of the pipelines through WL-I1 via the open cut method will be conducted in accordance with all permit conditions/requirements as well as the revised/updated Erosion & Sediment and Restoration plan. Timber mats and bridges will be placed within the travel lane where the wetland is crossed to avoid soil compaction, allow for trench excavation, segregation of the wetland topsoil, and temporary stockpiling of excavated materials. In addition a Professional Geologist will advise on 1) maintaining the hydrology of adjacent areas through installation of drains/flumes and/or pumps if seeps essential to adjacent area hydrology are encountered, 2) the presence of groundwater confining layers (e.g., rock, clay, fragipan) and the presence of groundwater seeps and drains, and 3) 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. Any confining layer encountered will be restored to the original condition to the maximum extent under guidance of the Professional Geologist. At wetlands determined to require confining layer restoration, the Professional Geologist will be on-site during wetland backfilling to ensure proper soil layer restoration and will advise on bentonite sandbag layering along the entire or portions of the trench line at the appropriate height. Once the pipes and appropriate trench plugs are installed, the trench will be backfilled, restored to pre-existing elevations and hydrology, and revegetated.

As presented in Module S4.D in Attachment C of the permit modification application (Environmental Assessment – Project Monitoring Plan), SPLP has developed an extensive monitoring program for impacted resources and will comply with all monitoring requirements identified in the PPP Chapter 105 Joint Permit Application (E23-524. APS 879056). Specifically, hydrology will be evaluated during each inspection to ensure that the hydrologic regimes are similar to the preconstruction 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. Hydrology will also be monitored by observing soil morphology within stationary plots located in the temporarily impacted wetland. In addition, SPLP has developed a site-specific plan for WL-I1 (Restoration and Monitoring Plan – Wetland I1, September 2018) that expands the monitoring area to include all areas impacted by pipeline construction activities (i.e., the subsidence area and subsurface flowable fill). Accordingly, based on the evidence of existing hydrology in the impacted areas of WL-I1 and the detailed DEP-approved monitoring program and site-specific restoration plan for WL-I1 that will be implemented during and after construction, a study plan is not warranted at this time. However, if the restoration fails to eliminate permanent impacts to Wetland I1 or indirect impacts are documented, then a modified restoration plan (study plan) will be submitted to the DEP for review and approval.

5. The applicant needs to install orange protective fencing along the boundaries of each wetland in or adjacent to the LOD.

Response: Sheet ES-6.20 of the Erosion and Sediment Control & Site Restoration Plan presented in *Attachment D* of the permit modification application has been revised to include orange protective fencing along the boundaries of wetland WL-I1. The revised sheet is included in **Attachment II** of this response.

6. Explain in detail the present impacts to WL-I1 due to the ME1 valve station upgrade as is stated in the amendment request.

Response: The following provides an outline of the various activities that have been conducted at the ME1 valve site over the past few years.

- December 2015: A number of mats were placed at the existing Glen Riddle station to a conduct a line purge of 14" Twin Oaks-Newark line. The mats were required to provide the workspace necessary to effectively turn nitrogen transports around as part of the required line purge operations. Based on wetland delineation information provided by STV as part of their 2014 Glen Riddle construction design, the wetland boundaries were flagged/marked prior to placing the mats, and no mats were placed in the wetland. The mats were removed in 2016.
- June 2017: The Glen Riddle station was again utilized for required line purge operations. At that time, the mats were placed utilizing limit-of-disturbance (LOD) stakes and wetland boundary signs and markers, per the 2014 STV wetland delineation drawing. These mats remained in place for additional line purges related to 2 hydro-tests conducted in October 2017 and September 2018. All purge work related to the GRE requirements was completed in late 2018. In discussion with the MEII construction team in 2018, mats were left in place at their request due to the ongoing MEII HDD efforts in the area.

As part of the MEII Chapter 105 permitting process, the entire PPP right-of-way was surveyed in 2014 for aquatic resources. The results of this survey effort were compiled in the *Aquatic Resources Report for the Pennsylvania Pipeline Project, Southeast Region, Delaware County, Pennsylvania* report that was submitted to the DEP as Enclosure A of Attachment 11 in the Joint Permit Application which was approved by DEP on February 2017 (Permit No. E23-524). The survey area for the PPP was much larger than the area surveyed by STV and the boundary of WL-I1 was extended. In addition, the PPP survey identified the existing MEI ROW as a PEM wetland based on the presence of wetland characteristics (soils, hydrology and vegetation). Consequently, the timber/construction mats placed around the Glen Riddle station as part of the line purge MEI work in 2017 using the STV wetland boundaries are located within the WL-I1 boundaries as delineated for the PPP.

As stated above, these mats were left in place to facilitate the PPP as the permitted 620 HDD was experiencing problems in 2018. Specifically, the HDD experienced a total of three inadvertent returns (IR) within wetland WL-I1 and an area of subsidence was observed at one of the IR locations in July and August 2018. Each IR was contained and cleaned-up according to permit requirements and DEP-approved plans developed as part of SPLP's permit application: no additional mats were placed/required in WL-I1 as part of the IRs' cleanup. In addition, the subsidence area was filled with flowable fill due to proximity, and threat to, existing in-service utilities. At that time, all HDD activities were suspended and SPLP completed the following tasks specific to WL-I1:

- September 2018: A site-specific *Restoration and Monitoring Plan for Wetland WL-I1* was developed and submitted to PADEP in response to the subsidence area and restoration of the flowable fill area within the wetland.
- October 2018: SPLP treated the *Phragmites australis* areas within wetland WL-I1
- May 2019: The subsidence are in Wetland WL-I1 was restored per the approved *Restoration and Monitoring Plan for Wetland WL-I1.*
- June 2019: A second treatment of the *Phragmites australis* areas within wetland WL-I1 was completed.
- March 2019 – a major permit modification to change the proposed crossing method to an open cut was prepared and submitted to DEP.

Upon receipt of an approved permit modification, the crossing of WL-I1 will be completed and all construction related material (i.e., mats) will be removed and the area will be restored to pre-existing conditions and monitored in accordance with all permit requirements/conditions.

7. Submit a clearance letter from the Pennsylvania Historic and Museum Commission regarding the plan to survey six acres designated as an Area of Potential Effect.

Response: Tetra Tech conducted a Phase I cultural resources survey of the modification area in April 2019. No cultural material or archaeological sites were identified during the Phase I cultural resources survey and no further cultural resource investigations were recommended. In a letter dated May 21, 2019, the Pennsylvania Historic and Museum Commission (PHMC) concurred with

Tetra Tech's recommendations for the modification area. A copy of the PHMC clearance letter was sent via email from Mr. Brad Schaeffer on May 22, 2019 and is provided in **Attachment III** of this response with a copy of the Negative Survey Form (4/18/19).

Hard copies of this response will be provided to the Department upon request. Should you have questions regarding this correspondence, please do not hesitate to contact me at 716-860-7495 or via e-mail at brad.schaeffer@tetratech.com

Sincerely,

Brad Schaeffer
Project Manager/Senior Biologist
Tetra Tech, Inc.

Enclosures: Attachments

cc: D. Caplan, U.S. Army Corps of Engineers, Philadelphia District
N. Bryan, Energy Transfer
M. Styles, Energy Transfer
C. Embry, Energy Transfer
B. Schaeffer, Tetra Tech

Attachment I

ATTACHMENT A

Project Description and Alternative Analysis

Revised June 2020

Project Description

Sunoco Pipeline LP (SPLP) requests a major permit modification for a change in the installation method of the 20-inch and portions of the 16-inch diameter pipelines previously permitted as the 0620 Horizontal Directional Drill (HDD) in Middletown Township, Delaware County. This permit request is to convert the HDD to a direct pipe through the residential areas Riddlewood Drive and Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, a conventional auger bore under Glen Riddle Road, and conventional open trench construction through Wetland WL-11 and Stream S-I2.

During the pilot hole drilling phase on the permitted 0620 HDD for the 16-inch pipeline installation through this area, there were several inadvertent returns (IRs) which resulted in drilling mud/fluid entering Waters of the Commonwealth, including three unnamed tributaries to Chester Creek (Streams S-I1, S-I2, and S-I3) and one wetland (WL-I1). In order to contain and clean-up these IRs, SPLP installed sandbag containments, flumes, and pump arounds. In addition, groundwater was encountered at the eastern end of the HDD near Stream S-I2, resulting in dewatering issues and safety concerns in the pits. As a result, given SPLP's experience during the 16-inch HDD at this location, SPLP has elected install the pipelines through this area with an alternate installation method that eliminates the potential for IRs to impact Waters of the Commonwealth.

This permit modification requests the conversion of an approximate 0.66-mile (3,500 feet) HDD to a combination of direct pipe, conventional bore, and open cut installation methods for the 20-inch and portions of the 16-inch diameter pipelines. The new installation method will involve the open cut of Wetland WL-I1, a~~n~~ non-Exceptional Value (non-EV) or "other" wetland, to install both pipes and an open cut to install the 20-inch pipe across Stream S-I2 (refer to *Attachments C and E* for additional information about these water resources). An open trench installation method across these resources will result in temporary, short term impacts to streams and wetlands, but will eliminate the risk of uncontrolled discharges associated with IRs and facilitate restoration of areas where IR containment measures remain or were implemented in these resources.

Stream S-I2 will be crossed in accordance with PPP's original Chapter 105 Joint Permit Application utilizing one of the following open-trench excavation methods for installation of the pipeline across waterbodies (refer to the E&S Plan standard typical drawings for details):

- **Dry Open Cut** – Minor waterbodies with no flow at the time of construction may be crossed using the open-cut crossing method.
- **Dry Flume** – A flumed crossing directs and contains the stream flow through an alternate mechanism across the stream channel to allow for the trenching and pipe installation to occur in dry conditions. Where practical, this allows for drier trenching, pipe installation, and restoration while maintaining continuous downstream flow.
- **Dry Pump Bypass** – The dam and pump bypass method may be used for crossings of waterbodies where pumps can adequately transfer stream flow volumes around the workspace. Similar to the flume crossing, this method allows for drier trenching, pipe installation, and restoration while maintaining continuous downstream flow.
- **Dry Cofferdam** – The cofferdam method, typically used on large streams/rivers, involves the installation of a cofferdam to isolate and divert flow around the workspace in two phases. The first phase consists of the cofferdam installation on one of the banks and approximately halfway 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. This method allows continuous flow around the workspace and eliminates concerns about sensitive species passage.

The selected open cut, dry stream crossing method will convey stream flow across the workspace and outlet downstream within the permitted limit-of-disturbance, such that work will be conducted in a dry stream channel. After the stream flow is contained and directed/conveyed across the work area, the trench will be excavated, and the 20-inch pipe will be installed via the open trench method through the stream in

accordance with all permit conditions and requirements. In order to efficiently complete all construction activities and minimize resource impacts, SPLP is proposing a 50-foot-wide limit of disturbance (LOD) across the perennial stream (S-I2).

Wetland WL-I1 will be crossed via the open trench method for both the 20- and 16-inch pipelines in accordance with all applicable permit conditions and requirements. In order to efficiently complete all construction activities and install both pipes at the same time through Wetland WL-I1 while minimizing the duration of construction and maintaining safety standards for working near "hot lines", SPLP is requesting an approximately 110-foot wide LOD through the PEM portion of WL-I1: the LOD width will be reduced, where necessary, to ensure there will be no impact to the PFO portion of this ~~EV~~ wetland. A large portion of the requested LOD in wetland WL-I1 is currently disturbed as part of the Mariner East 1 valve station upgrades as well as the approved restoration efforts associated with the previous IRs in this area.

Timber mats and bridges will be placed within the travel lane where the wetland and stream are crossed to avoid soil compaction, allow for trench excavation, segregation of the wetland topsoil and stream substrate material, and stockpiling of excavated materials. Once the pipes and appropriate trench plugs are installed, the trench will be backfilled, restored to pre-existing elevations and hydrology, and revegetated. All work will be conducted in accordance with permit conditions/requirements as well as the revised/updated Erosion & Sediment and Restoration plan (refer to *Attachment D* of this permit modification). The requested modification will not result in any loss of wetland area or water quality/quantity, and the localized resource impacts are considered minor and temporary.

Refer to *Attachment C - Environmental Assessment* for a discussion of existing conditions, potential impacts, mitigation/restoration, antidegradation compliance, and agency coordination associated with this requested change in construction method. In addition, *Attachment E* provides an updated Site Plan and Aquatic Resource Impact tables for the requested modification.

Alternatives Analysis

As noted in the original Project-wide Alternatives Analysis, the Department's regulations regarding the analysis of alternatives for proposed wetland impacts are principally set forth at 25 Pa. Code § 105.18 (a) and (b), depending upon whether the wetland is classified as an exceptional value wetland or an "other" wetland, respectively. The subject wetland WL-I1 is classified as a non-EV or "other" wetland, therefore the applicable regulation is 25 Pa. Code § 105.18(b). A summary of alternatives analysis compliance with these regulations is presented at the end of this Alternatives Analysis.

Also as noted in the original Project-wide Alternatives Analysis, in its review of Section 105 permit applications, the Department also determines the unavailability of alternative locations, routes and designs as set forth in 25 Pa. Code § 105.14(b)(7):

> (7) The extent to which a project is water dependent and thereby requires access or proximity to or siting within water to fulfill the basic purposes of the project. The dependency must be based on the demonstrated unavailability of any alternative location, route or design and the use of location, route or design to avoid or minimize the adverse impact of the dam, water obstruction or encroachment upon the environment and protect the public natural resources of this Commonwealth.

The Department's regulations do not include a requirement for a practicable alternative analysis for streams. However, SPLP performed and herein presents a practicable alternative analysis for the subject stream S-I2 in response to the Department's technical deficiency comment letter dated May 27, 2020.

Water Dependency

The crossing of wetland and stream resources is unavoidable due to the linear nature of the proposed PPP Project, and as described in the Environmental Assessment, S1.B – Water Dependency (refer to *Attachment C* of this permit modification).

Horizontal Directional Drill (HDD) Construction Method

Given the water dependency nature of the proposed PPP Project, to avoid direct impacts to these resources, SPLP originally planned to HDD under both the wetland (WL-I1) and stream (S-I2). However, there were complications encountered during the 16-inch pipeline HDD and drilling fluid discharges resulted in IRs into the Waters of the Commonwealth, as detailed in the Project Description above. As a result, SPLP has elected to install the pipelines through this area with an alternate installation method that eliminates the potential for IRs to impact Waters of the Commonwealth.

As part of the HDD reevaluation process, SPLP evaluated potential reroute and construction method alternatives for the crossings of the subject aquatic resources, WL-I1 (a palustrine emergent [PEM], non-EV/"other" wetland) and S-I2 (a perennial, non-High Quality/non-EV, Trout Stocked Fishery/Migratory Fishery waterbody), as discussed below.

Reroutes

SPLP evaluated other routes around the area, but these are limited due to the density of roads and residential properties surrounding the proposed route. In addition, a route to the west or east would likely impact more forested areas, possibly wetlands, and require a "greenfield", or new, right-of-way through these areas resulting in more permanent forested impacts.

Other Trenchless Construction Methods

SPLP evaluated the use of other (non-HDD) trenchless construction methods, including the FlexBor, Direct Pipe Bore, and conventional auger bore (CAB) construction methods for crossings of WL-I1 and S-I2 within the existing permanent right-of-way, but determined these alternative construction methods are not technically feasible due to workspace and infrastructure constraints and associated safety and environmental impact concerns, as well as possess a significant risk of failure due to the underlying geology and concerns regarding groundwater management, and therefore are considered not practicable taking into consideration existing technology and logistics, as discussed below.

The below analysis of other trenchless construction methods assumes a standard design setback distance of each entry/exit (pilot hole, exit hole, bore pits) from aquatic resources as a best management practice to avoid or minimize encountering groundwater tables and associated concerns related to hole/pit dewatering and discharge, hole/pit collapse and safety, and resource integrity (maintenance of hydrology and avoidance of wetland subsidence and stream bed/bank collapse). A design setback distance of 50 feet from aquatic resources is strongly preferred wherever practicable, with increasing risk of encountering the above-listed concerns with decreasing setback distance. Given groundwater management issues associated with the failed HDD attempt, a 50-foot setback distance is evaluated herein. Therefore, the below analysis is based on an approximately 292-foot-long crossing of WL-I1 (50-foot setback of north bore pit from northern wetland boundary, 192-foot-long crossing of WL-I1, and 50-foot setback of south bore pit from southern wetland boundary) for the installation of both the 16- and 20-inch pipelines, and a 107-foot-long crossing of S-I2 (50-foot setback of north bore pit from northern stream bank, 7-foot-long top-of-bank-to-too-of-bank crossing of S-I2, and 50-foot setback of south bore pit from southern wetland boundary) for the 20-inch pipeline, within the existing permanent right-of-way.

FlexBor Alternative

SPLP evaluated the use of the FlexBor construction method for an approximately 292-foot-long crossing of WL-I1 (for installation of both the 16- and 20-inch pipelines) and a 107-foot-long crossing of S-I2 (for installation of the 20-inch pipeline) within the existing permanent right-of-way, and determined this

trenchless crossing alternative **is neither technically feasible nor practicable** due to the limitations of this existing technology, as discussed below.

FlexBor is a hybrid of HDD and auger boring that can be pit or surface launched and is designed to minimize inadvertent return potential during the reaming process. Water and pressurized air are used during pilot if drilled, or the pilot may be forwarded by a tracked/steered hydraulic tool. The FlexBor technology is specifically designed to not use bentonite in the reaming phase, which could introduce a foreign material in the event of an IR. Cuttings in the pilot phase return along annulus using air and water if drilled. Cuttings during the ream are returned inside a "casing" behind the reamer using high pressure air with water injection blown down the casing. As a result, IR potential during the ream is substantially reduced. A FlexBor can be employed using a small hydraulic powered unit or a converted standard HDD unit.

SPLP contractors have attempted three (3) FlexBors and partially completed two of these to replace HDDs on the PPP Project. One FlexBor failed in the pilot phase and was replaced with a conventional auger bore under a highway and open cut construction. The two partially successful FlexBors completed the pilot phases, but both had difficulties completing the reaming phase. SPLP's analysis is that this technology is not perfected for larger diameter bore attempts.

Based on the results of this evaluation, use of the FlexBor construction method for the two subject aquatic resource crossings: 1) is not a technically feasible alternative; and 2) therefore, is not a practicable alternative taking into consideration existing technology. Therefore, the FlexBor construction method is not the preferred or selected alternative for these crossing locations.

Direct Pipe Bore Alternative

SPLP evaluated the use of the Direct Pipe Bore construction method for an approximately 292-foot-long crossing of WL-I1 (for installation of both the 16- and 20-inch pipelines) and a 107-foot-long crossing of S-I2 (for installation of the 20-inch pipeline) within the existing permanent right-of-way, and determined this trenchless crossing alternative **is neither technically feasible nor practicable** due to the limitations of this existing technology and logistics, as discussed below.

The Direct Pipe Bore method is also known as "microtunneling". This method of pipeline installation is a remote-controlled, continuously supported pipe jacking method. During the direct pipe installation, operations are managed by an operator in an above-ground control room alongside of the installation pit. Rock and soil cutting and removal occurs by drilling fluid injection through the cutting tool during rotation at the face of the bore, and the cuttings are forced into inlet holes in the crushing cone at the tool face for circulation to a recycling plant through a closed system. The entire operating system for this method of pipeline installation, including the cutting tool drive hydraulics, fluid injection, fluid return, and operating controls are enclosed inside the outside diameter bore pipe (or casing pipe) being installed. At the launching point/entry pit, the bore pipe is attached to a "jacking block" that hammers the bore pipe while the tool is cutting through the substrate or geology. The cutting tool face is marginally larger in diameter than the pipe to which it is attached. As a result, there is minimal annulus space, which minimizes the potential for drilling fluid returns or the production of groundwater returning back to the point of entry.

Insufficient Workspace and Significant Safety Hazards

Insufficient workspace is available to setup a Direct Pipe Bore entry rig and associated pipe stringing behind the entry rig along the existing permanent right-of-way at both aquatic resource crossings, and therefore use of this construction method is not technically feasible. Specifically, use of the Direct Pipe Bore construction method requires a minimum of a 50-foot-square area for the entry rig setup (in turn setback 50 feet from the aquatic resource boundary) that is excavated to install anchoring for the rig and the rig itself; substantive and unencumbered additional temporary workspace for ongoing movement and storage of construction equipment, materials, casing pipe sections, and spoil storage during the entire construction phase; and linear pipe string workspace slightly longer than the crossing length (to weld the full pipe string prior to installation into the pre-installed casing) in a straight-line directly behind the entry rig. For the WL-I1 crossing, the pipe string would consist of a 292-foot-long, dual (bundled), 16- and 20-inch pipelines (to

be installed through the pre-installed 42- to 48-inch casing to be installed one section at a time). For the S-I2 crossing, the pipe string would include a 107-foot-long, 20-inch pipe (to be installed by welding on to the end of the pre-installed 20-inch casing to be installed on section at a time).

For the WL-I1 crossing location, if the entry rig workspace were located on the south side of the crossing, the entry rig would be placed partially on top of the existing SPLP Glen Riddle Station and AQUA Water Intake Facility, and the 292-foot-long dual pipe strings would be placed on top of the SPLP Glen Riddle Station and an approximately 100-foot-long portion of S-I2 located within and parallel to the existing permanent right-of-way. Therefore, setup of the entry rig and pipe string on the south side of the WL-I1 crossing is not technically feasible.

For the WL-I1 crossing location, if the entry rig workspace were located on the north side of the crossing (to the north of and setback 50 feet from the wetland boundary and south of the apartment complex/parking lot), although the workspace would be located on open upland associated with permanent maintained right-of-way, the entry rig would be located on top three existing and active pipelines (see Figure 1). This would require excavation of an extensive (approximately 15- to 20-foot deep) open bore pit, including excavating around and below the three active pipelines, thereby exposing these pipelines and requiring supports to suspend the pipelines in air above the base of the bore pit. This also would require carefully lowering in, installing, operating, and removing the extremely heavy anchoring and Direct Pipe Bore machine between the three suspended active pipelines. This entry rig setup presents a significant safety hazard that is considered not technically feasible. In addition, 292-foot-long dual pipe strings would be placed across the entire length of the apartment complex parking lot to the north, and when considered in combination with the requirement for substantive and unencumbered additional temporary workspace for ongoing movement and storage of construction equipment, materials, casing pipe sections, and spoil storage during the entire construction phase, the parking lot and apartment complex would likely need to be closed (no access or use) for the entire duration of construction. Alternatively, the pipe string would need to be transported, welded, and staged to the south within WL-I1 during completion of the casing installation, pulled back north into apartment complex parking lot, then installed into the casing beneath WL-I1, which thereby defeats the purpose of the Direct Pipe Bore avoiding direct impact to WL-I1. Therefore, setup of the entry rig and pipe string on the north side of the WL-I1 crossing is not technically feasible.

For the S-I2 crossing, if the entry rig workspace were located on the south side of the crossing (to the south of and setback 50 feet from the southern stream bank), although the workspace would be located on open upland associated with permanent maintained right-of-way, the entry rig would be located entirely or partially on top four existing and active pipelines (see Figure 1). As with the WL-I1 crossing setup north of the wetland, this would require excavation of an extensive (approximately 15- to 20-foot deep) open bore pit, including excavating around and below the four active pipelines, thereby exposing these pipelines and requiring supports to suspend the pipelines in air above the base of the bore pit. This also would require carefully lowering in, installing, operating, and removing the extremely heavy anchoring and Direct Pipe Bore machine between the four suspended active pipelines. This entry rig setup presents a significant safety hazard that is considered not technically feasible. Therefore, setup of the entry rig and pipe string on the south side of the WL-I1 crossing is not technically feasible.

For the S-I2 crossing, if the entry rig workspace were located on the north side of the crossing, the entry rig would be placed partially on top of the existing SPLP Glen Riddle Station, and the 125-foot-long, 20-inch pipe string would be placed on top of the SPLP Glen Riddle Station and AQUA Water Intake Facility. Therefore, setup of the entry rig and pipe string on the north side of the WL-I1 crossing is not technically feasible.

Underlying Geology and Groundwater Management Concerns

If sufficient workspace were available, use of the Direct Pipe Bore construction method (where the casing supports the bore hole during the boring process) presents a potential but likely limited risk of failure and IRs, even with the native soils having poor structure that are fragile and unstable (see CAB construction method for additional detail on native soils). However, due to the position of the Direct Pipe Bore entry/exit

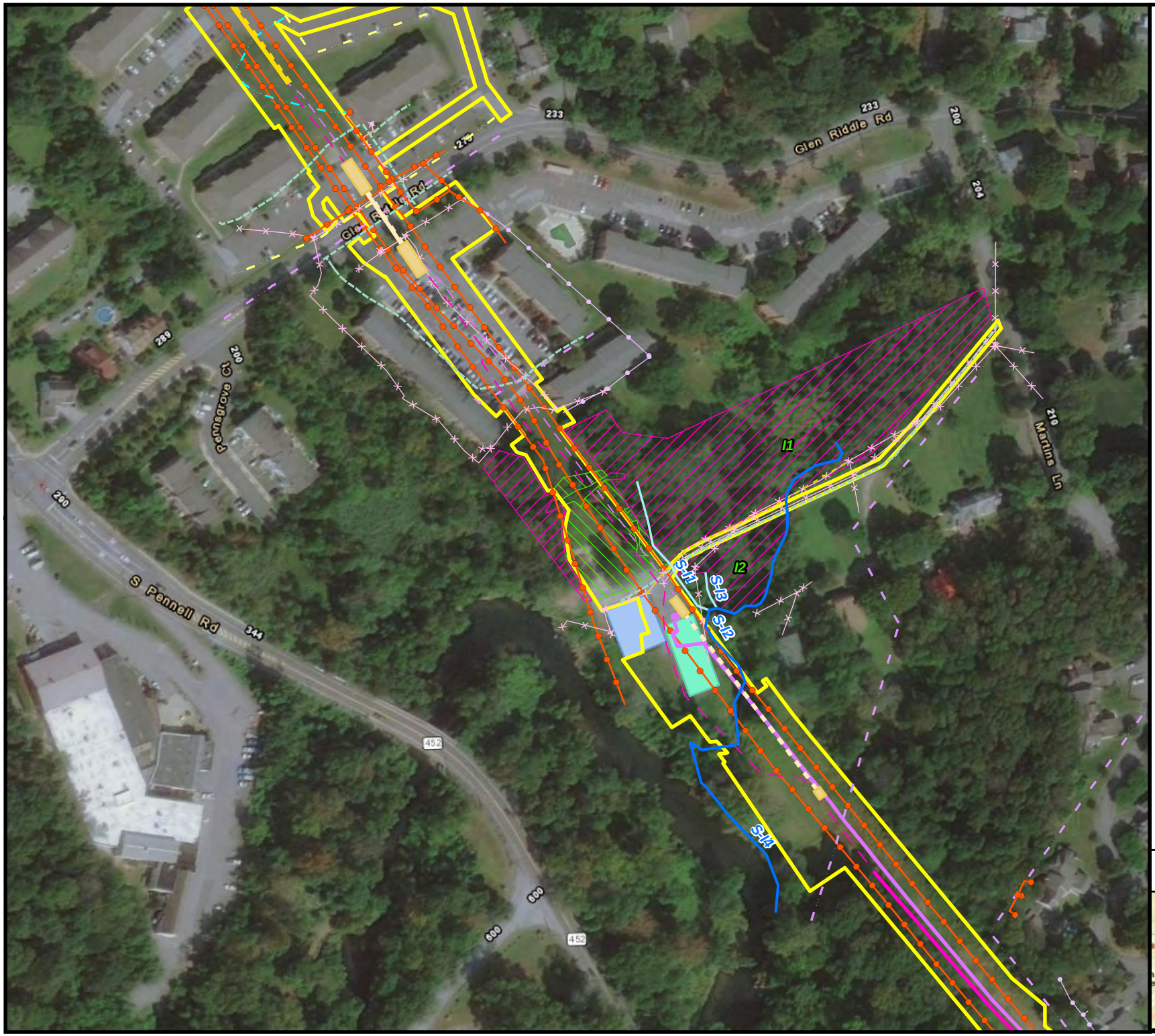

Figure 1.
Aboveground and Buried Utility Infrastructure Constraints in the Vicinity of Aquatic Resource Crossings.
Proposed 0620 HDD Installation Method Change, Middletown Township, Delaware County, PA.

LEGEND

- LOD
- PPP 1 (Proposed)
- PPP 2 (Proposed)
- PPP 1 (Installed)
- PPP 2 (Installed)
- PPP 1, Bore
- PPP 1, Direct Pipe
- PPP 2, Bore
- PPP 2, Direct Pipe
- Bore Pit
- AQUA Water Intake Facility
- SPLP Glenn Riddle Station
- Existing Electric Line
- Existing Fiberoptic Cable
- Existing Gas Line
- Existing Pipeline
- Existing Sanitary Sewer
- Existing Storm Sewer
- Existing TV Line
- Existing Water Line
- Ephemeral Stream
- Perennial Stream
- PEM Wetland
- PFO Wetland

N

SCALE: 1 IN = 200 feet

Feet 0 100 200

Date: 6/12/2020

Prepared By: TETRA TECH

Sources: Base Layer - National Geographic, Esri.

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holes in relation to the subject aquatic resources (even with a 50-foot setback) and Chester Creek, it is highly likely that the bore pits will be saturated (below the water table) and require ongoing trench water dewatering and discharge during the entire period of construction, as was experienced during the failed HDD attempt, which in turn represents a significant risk of bore hole collapse, safety hazards, and risk of failure. As a result, use of the Direct Pipe Bore construction method is not practicable taking into consideration existing technology (requirement for bore holes) and logistics (groundwater management, safety hazards, and risk of failure).

Conclusion

Based on the results of this evaluation, although there are additional considerations that present significant to substantive risks of failure (i.e., geology, groundwater) and further reduce practicability (i.e., additional logistical concerns, cost), use of the Direct Pipe Bore construction method for the WL-I1 and S-I2 crossings: 1) is not a technically feasible alternative; and 2) therefore, is not a practicable alternative taking into consideration existing technology and logistics. Therefore, the Direct Pipe Bore construction method is not the preferred or selected alternative for this crossing location.

Conventional Auger Bore (CAB) Alternative

Similarly, SPLP evaluated the use of a conventional auger bore (CAB) construction method for an approximately 292-foot-long crossing of WL-I1 (for installation of both the 16- and 20-inch pipelines) and a 107-foot-long crossing of S-I2 (for installation of the 20-inch pipeline) within the existing permanent right-of-way ~~was evaluated for the wetland and stream areas~~, ~~but it was~~ and determined this trenchless crossing alternative **is neither technically feasible nor practicable** ~~not to be feasible~~ due to the length limitations of this existing technology, insufficient workspace, and additional limitations associated with the underlying geology and concerns regarding groundwater management. Therefore, use of the CAB construction method is not a practicable alternative taking into consideration existing technology and logistics, as discussed below.

Conventional auger bores are a motor powered, pit launched, non-steerable method for the installation of pipes, conduits, and cables. The bore unit assembly is guided by rails or tracks inside a pit. The cutting tool is installed at the front of a screw auger in front of and inside a casing as a composite unit. The cutter and auger is “pushed” by the drive motor while simultaneously turning the cutter head and screw auger inside the casing. The cuttings are returned to the entry pit through the casing by the screw auger. The cutter is cooled by water injection if necessary. The exterior casing of the auger bore is lubricated during operations by water, or a bentonite/water slurry to prevent binding or sticking to the surrounding subsurface. Conventional auger bores are subject to deflection by rock geology, rocks in the subsurface, or other unknown hard objects in the bore path.

Length Limitations of Existing Technology

As discussed in the original Alternatives Analysis (Section 4.1.2 – Practicability Constraints in the Trenchless Construction Feasibility Analysis [TCFA]), auger boring was initially developed to cross under two-lane roadways with an average length of 40 feet and a maximum length of 70 feet. However, with demand for longer installations increasing, the current maximum extent for a CAB installation of a 16-inch-diameter pipeline is approximately 390 feet (note that 390 feet was used as an initial screening criterion in the TCFA). Accordingly, this crossing methodology should only be considered for avoidance of obstacles of somewhat less than 390 feet in length, and therefore would be considered not technically feasible for the current 1,221-foot-long crossing alignment. Based on experience gained during construction of the PPP Project, conventional auger bores should be limited to approximately 200 linear feet at a time, or less, varying by the underlying substrate. Conventional auger bores for the 16- and 20-inch pipelines, attempted at longer distances, have at times had alignment drift and elevation deflections which have complicated installation. Drift and deflection are safety concerns when boring adjacent to in-service pipelines and other utilities.

Given use of the CAB construction method is technically limited to less than 200 linear feet at a time (and varying by the underlying substrate), use of this method is not technically feasible due the length limitations of this existing technology for the approximately 292-foot-long crossing of WL-I1 for the installation of both the 16- and 20-inch pipelines within the existing permanent right-of-way. Conversely, use of this method is potentially feasible (depending upon the underlying substrate) based on length only for the approximately 107-foot-long crossing of S-I2 for the 20-inch pipeline within the existing permanent right-of-way.

Insufficient Workspace and Significant Safety Hazards

In addition, although use of the CAB construction method requires slightly smaller workspace for the auger bore rig (a minimum of a 50-foot by 25-foot entry bore pit) compared to the Direct Pipe Bore entry rig (a minimum 50-foot-square bore pit), insufficient workspace is available to setup the CAB bore pits and associated pipe stringing behind the entry bore pit along the existing permanent right-of-way at both aquatic resource crossings for similar reasons (i.e., workspace constraints, active pipeline exposure and suspension, associated significant safety hazards) discussed for the Direct Pipe Bore construction method alternative. Therefore, use of the CAB construction method is not technically feasible.

Limited Resource Impact Reduction Value

Given the CAB construction method is a non-steerable (fixed path) technology, additional caution is required to ensure a clear bore path such that the auger does not intersect existing buried infrastructure. In this particularly congested area with multiple active buried pipelines, it is common practice to pothole (excavate) at 10-foot intervals along the existing pipeline alignments to confirm the horizontal and vertical location of the active buried pipelines. In the case of the WL-I1 (three existing pipeline crossings) and S-I2 (four existing pipeline crossings), this represents an excavation activity across these resources that somewhat defeats the purpose of a trenchless crossing. In addition, due to workspace and access constraints in this congested area, equipment travel lanes/bridges would be required across WL-I1 and S-I2, further reducing the impact avoidance purpose of a trenchless crossing.

Underlying Geology and Groundwater Management Concerns

Finally, use of the CAB construction method uses an auger that excavates the soil/rock ahead of the pipe casing and then the casing is pushed into the bored hole, meaning the casing does not support the hole as it is bored (in contrast to the Direct Pipe Bore construction method where the casing supports the bore hole). Therefore, soils will poor structure that are fragile and unstable present a significant risk of not only IRs, but also bore hole collapse and in turn subsidence of the soil and features above the bore hole. SPLP conducted vertical geotechnical soil borings across the WL-I1 and S-I2 crossing areas and determined the native soils (to a depth up to approximately 75 feet below ground surface) primarily consist of silt, fine silt, fine sand, and fine gravel, and as a result have very poor structure. Therefore, use of the CAB construction method across these aquatic resources (with a bore hole at much shallower depth than the failed HDD) presents a significant risk of IRs, bore hole collapse, and feature subsidence or collapse, as was experienced during the attempted but failed HDD construction method (at much greater depth) beneath these aquatic resources. This represents a particular risk for stream bed collapse, as was experienced at WL-C6 (Spread 5, Wyomissing County) which ultimately was converted to a dam-and-pump bypass construction method. In addition, use of the CAB construction method in these poor structure soils presents a significant risk for the loss of auger bore tooling and downward drifting of the bore hole below the targeted trajectory, and ultimate failure of the attempted bore. Therefore, use of the CAB construction method presents a significant risk for failure, bore hole collapse, and aquatic feature collapse, that would not only result in increased environmental impacts to WL-I1 and S-I2 compared to use of the open cut construction method, but also is not considered a practicable alternative taking into consideration existing technology.

Finally, due to the position of the CAB bore holes in relation to the subject aquatic resources (even with a 50-foot setback) and Chester Creek, it is highly likely that the bore pits will be saturated (below the water table) and require ongoing trench water dewatering and discharge during the entire period of construction, as was experienced during the failed HDD attempt, which in turn represents a significant risk of bore hole

collapse, safety hazards, and risk of failure. As a result, use of the CAB construction method is not practicable taking into consideration existing technology (requirement for bore holes) and logistics (groundwater management, safety hazards, and risk of failure).

Conclusion

Based on the results of this evaluation, although there are additional considerations that present significant to substantive risks of failure (i.e., geology, groundwater) and further reduce practicability (i.e., additional logistical concerns), use of the CAB construction method for the WL-I1 and S-I2 crossings: 1) is not a technically feasible alternative; and 2) therefore, is not a practicable alternative taking into consideration existing technology and logistics. Therefore, the CAB construction method is not the preferred or selected alternative for this crossing location.

Open Cut Construction Method

SPLP evaluated the use of an open cut construction method to cross WL-I1 and S-I2 within the existing permitted right-of-way. The open cut construction method is technically feasible for use to cross WL-I1 and S-I2, including the implementation of SPLP's Project-wide and site-specific impact avoidance and minimization measures (see Other Impact Avoidance and Minimization Measures). Specifically, although somewhat constrained by aboveground and buried infrastructure (see Figure 1), sufficient workspace is available within the existing permitted right-of-way to support construction equipment and materials, travel lanes (WL-I1 and S-I2), equipment bridge (S-I2), and additional temporary workspace located outside of aquatic resource boundaries. Due to the nature of the open trench construction method, which uses direct excavation from the ground surface and avoids boring/drilling methods that use drilling fluids, this method avoids potential risks of IRs and bore hole collapse, and minimizes the potential for aquatic feature subsidence or collapse, as was experienced during the attempted but failed HDD construction method (at much greater depth) beneath these aquatic resources. Due to the relatively shallow excavation depth of the open trench construction method compared to the depth of trenchless construction method bore/entry pits, use of this method is likely to encounter less groundwater and require a lower volume and/or frequency of trench dewatering and discharge. Although additional caution is required to ensure a clear trench excavation path in this particularly congested area to avoid intersecting multiple active buried pipelines, limited potholing (excavation) would be required (compared to non-steerable [fixed path] boring technology), as the open cut construction method uses more controlled direct excavation from the ground surface along the proposed pipeline alignments to be placed parallel to and offset from the known alignments of the active buried pipelines.

With the implementation of SPLP's Project-wide and site-specific impact avoidance and minimization measures (see Other Impact Avoidance and Minimization Measures), use of the open cut construction method will result in impacts to WL-I1 and S-I2 that will be minor and temporary, and are considered not significant or adverse, as well as avoid or minimize impacts on wetland, stream, other environmental, and human environment resources to the maximum extent practicable within the existing permitted right-of-way.

Conclusion

Based on the results of this evaluation, SPLP determined the use of the open cut construction method is a technically feasible alternative within the existing permitted right-of-way. In fact, given other (non-HDD) trenchless construction methods were determined to be not technically feasible, the open cut construction method is the only technically feasible alternative within the existing permitted right-of-way taking into consideration existing technology and logistics. SPLP also determined the open cut construction method has the least impact on environmental and human environment resources, and is the most effective and practicable means for installing the pipelines and restoring the previous IR areas taking into consideration existing technology and logistics.

Other Impact Avoidance and Minimization Measures

In its technical deficiency letter dated May 27, 2020, the Department stated that the alternative analysis must full assess other impact avoidance and minimization measures. As presented in the original Chapter 105 and Chapter 102 permit applications, associated plans and procedures, and the Project-wide Alternatives Analysis, SPLP incorporated numerous programmatic routing/siting, over 40 wetland crossing, and over 60 waterbody crossing industry-standard and agency required or recommended impact avoidance and minimization best management practices (construction and restoration procedures or measures), which have been applied on a programmatic, project-wide, and site-specific basis on the PPP Project. These applications and associated best management practices (measures) are incorporated herein by reference, and include, but are not necessarily limited to, the measures and associated resultant impact avoidance and minimization effects presented below.

Project-Wide Programmatic Impact Avoidance and Minimization Measures

As part of its initial Project-wide programmatic planning and routing approach, SPLP adopted the following programmatic impact avoidance and minimization measures, as detailed in the original Project-wide Alternatives Analysis (see Section 3.0) and used these same procedures when developing the Glen Riddle/0620 HDD reroute.

Best Management Practice (Measure)	Impact Avoidance and Minimization
Initial/Detailed Pipeline Routing – Initial and detailed route selection co-located (abut and/or overlap) an existing SPLP right-of-way or other existing utility corridors (in accordance with the Governor's Pipeline Infrastructure Task Force Report, USFWS, and other federal, state, and local agency recommendations).	• Major means to **avoid** environmental impacts and impacts to sensitive resources and communities. • Major means to **minimize** the site-specific and cumulative environmental impacts arising from the Project.
Major Route Alternatives – Initial and detailed evaluation and adoption of major route alternatives in areas of obvious constraints and impacts (congested areas with major infrastructure, communities, and sensitive resources.	• Major means to **avoid** significant, and further **avoid** and **minimize,** impacts on environmentally sensitive resources, such as large population centers, scenic areas, wildlife management areas, or cultural/historically significant resources proposed to be crossed by the Project, and/or improve public health and safety.
Programmatic Impact Reduction Measures – Incorporation of the following programmatic impact avoidance and minimization measures into the Baseline Route Alternative: • Reduction of pipeline construction right-of-way from 100-foot-wide to 75-foot-wide in upland areas. • Narrowing of pipeline construction right-of-way from 100-foot-wide to 50-foot-wide at wetland and waterbody crossings. • Change from conventional wet open cut construction method to dry open cut construction methods across all wetlands and waterbodies. • Proposed Route Alternative – adoption of Minor Route Variations and Trenchless Construction Methods across the Baseline Route Alternative. • Cumulative Impact Reduction – the resultant cumulative impact reduction from the Baseline Route Alternative to the Proposed Route Alternative.	As presented in the original Project-wide Alternatives Analysis, Table 1, adoption of these Programmatic Impact Reduction Measures into the Baseline Route Alternative, where practicable, resulted in a cumulative avoidance and minimization of Project-wide impacts on: • EV wetland crossings (reduced by 43 crossings or 23.8%); • EV wetland areal extent (reduced by 20.9 acres or 65.1%); • Other wetland areal extent (reduction by 61.3 acres or 70.6 percent); • PFO wetland areal extent (reduction by 33.7 acres or 95.7 percent); • HQ and EV stream crossings (reduction by 20,622 linear feet or 58.9 percent); • Non-HQ and EV stream crossings (reduction by 50,817 linear feet or 56.8 percent); • Cumulative impact reduction to wetlands by 69.1 percent and to streams by 57.3 percent.

As further stated in the original Project-wide Alternatives Analysis (see Section 4.0), constructing and operating a natural gas liquids pipeline is not, per se, a water-dependent project. However, because of Pennsylvania's abundant water and wetland resources, any project which travels approximately 300 miles east-west across the Commonwealth requires the crossing of, and therefore access to, waters and

wetlands. The Project requires access and proximity to and siting in, on, over or under waters and wetlands in order to achieve its primary purpose to transport natural gas liquids from Houston, Washington County to SPLP's existing facility in Marcus Hook, Delaware County. Therefore, the linear nature and approximately 300-mile length of the Project across 17 counties east-west in Pennsylvania makes the Project water-dependent.

Following SPLP's initial Project-wide programmatic planning and routing approach and SPLP adoption of the above programmatic impact avoidance and minimization measures, the analysis set forth in the original Project-wide Alternatives Analysis concluded that there is no practicable alternative to each of the crossings to waters and wetlands that would have less effect on each water or wetland, and not have other significant adverse effects on the environment, taking into consideration construction costs, existing technology and logistics.

Given the water dependency of the Project, SPLP proposed and incorporated over 40 wetland crossing and over 60 waterbody crossing industry-standard and agency required or recommended impact avoidance and minimization best management practices (construction and restoration procedures or measures) to further avoid or minimize impacts to these aquatic resources on a programmatic, project-wide, and site-specific basis on the PPP Project. These measures include, but are not necessarily limited to, those detailed in the original Chapter 105 permit application's Impact Avoidance, Minimization, and Mitigation Procedures (Attachment 11: Enclosure E, Part 4), Erosion & Sedimentation Control Plan (Attachment 12), and other plans and procedures incorporated herein by reference. The following sections provide a summary of the Impact Avoidance, Minimization, and Mitigation Procedures related to wetlands and waterbodies that SPLP is committed to implementing on the proposed reroute.

Project-Wide Wetland Crossing Impact Avoidance and Minimization Measures

The following Impact Avoidance, Minimization, and Mitigation Procedures (see Section 9.0) apply to use of the open trench construction method across wetlands on a programmatic, project-wide, and site-specific basis.

Best Management Practice (Measure)	**Impact Avoidance and Minimization**
Expedited Construction – Expedite construction in and around wetlands by implementing the construction methods itemized within Section 9.2 of the Impact Avoidance, Minimization, and Mitigation Procedures. 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.	Expediting wetland construction activities to the shortest duration practicable **minimizes all potential direct and indirect impacts** associated with the crossing, including but not limited to: establishment of travel lane with timber mats, in-wetland construction equipment, soil compaction, trenching, maintenance of segregated topsoil and subsoil, sidecasting of trench spoil, dewatering, discharge of trench water, backfiling, return and stabilization of pre-construction contours and hydrology, and restoration and revegetation.
Timing Restrictions – There are no noted timing restriction windows on crossing any of the wetland areas on the Project.	Not applicable.
Wetland Construction Methods (Open Cut) – 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.	• **Avoids** treating the wetland as an upland. • Clearly demarcates wetland boundaries to **avoid** potential encroachment of construction activities in wetlands. • **Avoids** contamination in wetland soils from construction equipment fuels. • **Minimizes** the potential for secondary impacts to wetlands from construction activities.

• Place orange safety fence between the limit of disturbance (LOD) and adjacent wetlands.	• **Avoids** treating the wetland as an upland. • Clearly demarcates wetland boundaries to **avoid** potential encroachment of construction activities in wetlands. • **Minimizes** the potential for secondary impacts to wetlands from construction activities.
• Stabilize wetland travel lane approaches.	• **Avoids** sedimentation and erosion in wetlands, thereby **minimizing** efforts to achieve post-construction restoration to pre-construction contours.
• Material storage areas shall be located at least 100 feet away from the wetland edge.	• **Minimizes** the potential for debris and contaminants from storage areas to reach wetlands.
• Attempt to use no more than two layers of timber mats to stabilize the construction ROW.	• **Avoids** direct rutting of wetland soils and **minimizes** wetland soil compaction, thereby **minimizing** efforts to achieve post-construction restoration to pre-construction contours.
• Cut vegetation off at ground level leaving existing root systems in place and remove cut vegetation from the wetland for disposal.	• Allows for continued stabilization of soil by existing root systems to **minimize** erosion/loss of native soils. • **Minimizes** efforts to achieve post-construction restoration to pre-construction contours.
• 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.	• Allows for continued stabilization of soil adjacent to the trench line to **minimize** erosion/loss of native soils. • **Minimizes** efforts to achieve post-construction restoration to pre-construction contours. • **Avoids** creating a safety hazard from destabilized ground adjacent to the trench line.
• Segregate the topsoil from the area disturbed by trenching in unsaturated wetlands.	• **Avoids** loss of topsoil, native plant seedbank in topsoil, and native plant root structures, thereby allowing replacement of topsoil and **minimizing** efforts to achieve post-construction revegetation.
• Install temporary timber mats along the travel lane. Equipment will work from the mats.	• **Avoids** direct rutting of wetland soils and **minimizes** wetland soil compaction, thereby **minimizing** efforts to achieve post-construction restoration to pre-construction contours.
• 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.	• **Avoids** adverse impacts to adjacent wetland hydrology. • **Minimizes** effort to achieve successful restoration by maintaining post-construction wetland hydrology in areas temporarily impacted by pipeline construction.
• Assemble pipe in upland areas unless wetland is dry enough to adequately support skids and pipe.	• **Avoids** and/or **minimizes** the need for equipment traffic in wetland. • **Minimizes** duration of construction activities in wetland. • **Avoids** rutting of wetland soils and/or placement of timber mats in wetlands, thereby **minimizing** temporary disturbance in the wetland.
• If streams are present implement dry crossing methods.	• **Avoids** altering stream flow during construction by maintain flow via dam and pump, flume, etc. • Isolate construction area and thereby **minimize** downstream sedimentation, erosion, and turbidity during excavation/installation of pipeline.
• Restoration activities within wetlands (See typical wetland restoration) shall begin immediately after backfilling, weather permitting.	• **Minimizes** the duration of destabilized areas that could contribute to sedimentation and erosion in wetland. • **Minimizes** the time necessary for successful restoration.
• No soil amendments such as agricultural lime or fertilizer will be used within the wetland areas.	• **Avoids** altering wetland soil and water chemistry which could impede successful restoration. • **Avoids** the potential for water quality degradation in wetland that could change plant and aquatic fauna composition.

	• **Avoids** the potential for downstream water quality degradation.
• Restore wetlands to the original contours and surface flow.	• **Avoids** impacts to wetland hydrology, thereby **minimizing** the potential for unsuccessful restoration.
• 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).	• **Avoids** direct rutting of wetland soils and **minimizes** wetland soil compaction, thereby **minimizing** efforts to achieve post-construction restoration to pre-construction contours.
• 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.	• **Minimizes** disturbance to soils. • **Minimizes** disturbance to wildlife that use vegetation. • Mats or pads **avoid** direct rutting of wetland soils and **minimizes** wetland soil compaction, thereby **minimizing** efforts to achieve post-construction restoration.
• 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.	• **Avoids** inadvertent fill in wetland which could impede restoration. • **Avoids** burying of debris and stumps, thereby avoiding significant soil disturbance that could impede restoration efforts. • **Minimizes** the potential for introduction of nuisance or exotic species that benefit from disturbed areas such as cut timber and brush piles. • **Avoids** habitat alteration that could make the wetland less suitable for wildlife use.
• 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.	• **Avoids** direct rutting of wetland soils and **minimizes** wetland soil compaction, thereby **minimizing** efforts to achieve post-construction restoration to pre-construction contours. • Limits temporary impacts from construction equipment ingress/egress to a defined travel lane instead of numerous random travel lanes, thereby **minimizing** impacts to wetlands.
• 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 Environmental Inspector (EI).	• Ensures original contours can be achieved, thereby **minimizing** efforts to achieve post-construction restoration to pre-construction contours. • **Minimizes** the potential for unsuccessful restoration.
• Orange fencing, compost filter stock (CFS), and erosion control measures shall be installed prior to grading at all wetland crossings.	• **Minimizes** the potential for erosion and sedimentation in wetlands during construction.
• 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.	• **Minimizes** the amount of grading necessary to achieve post-construction restoration to pre-construction contours. • **Avoids** loss of topsoil and native plant root structure/seedbank in topsoil, thereby allowing replacement of topsoil and **minimizing** efforts to achieve post-construction revegetation.
• Permanently stabilizing upland areas near wetlands shall occur as soon as possible after backfilling.	• **Avoids** erosion and sedimentation in wetlands. • **Minimizes** the duration of destabilized areas to contribute to erosion or sedimentation in wetlands.
• 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	• **Avoids** adverse impacts on wetland hydrology. • **Minimizes** effort to achieve successful restoration by maintaining post-construction wetland hydrology in areas temporarily impacted by pipeline construction.

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.	• **Avoids** erosion and sedimentation in wetlands, thereby **minimizing** efforts to achieve post-construction restoration to pre-construction contours.
• Waterbars are to be placed 50 feet from the top of bank except as noted on site specific plan drawings.	• Diverts potential stormwater overland flow from adjacent disturbed upland slopes to **avoid** erosion and **minimizes** potential discharge of turbidity and suspended sediment to adjacent or nearby wetland.
• Mark the top of streambank with high visible flagging and post resource and no refueling signs within 100 feet of top of streambank.	• Clearly demarcates streambank boundaries to **avoid** potential encroachment of construction activities in streams. • **Avoids** contamination in surface waters and soils of streams.
• Material storage areas shall be located at least 100 feet away from wetland edge.	• **Minimizes** the potential for debris and contaminants from storage areas to reach streams.
• Any excess fill material must be removed and not spread within the wetland.	• **Avoids** alteration of wetland grade and hydrology that could convert the wetland to an upland or reduce the functions provided by the wetland. • **Minimizes** the potential for unsuccessful restoration. • **Minimizes** efforts to achieve post-construction restoration to pre-construction contours.
Wetland Restoration Methods (Open Cut) – The following is a list of restoration methods generally applicable for all wetland crossings that will be open-cut:	
• Backfill trench; where soils were segregated, replace in order of removal (consult Spread Professional Geologist prior to and during backfilling).	• **Avoids** loss of topsoil, native plant seedbank/root structures, and soil composition thereby **minimizing** efforts to achieve post-construction revegetation.
• 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.	• **Avoids** impacts to wetland hydrology, thereby **minimizing** the potential for unsuccessful restoration. • Ensures topsoil with native plant seedbank/root structure is restored, thereby **minimizing** effort to achieve post-construction revegetation.
• Once backfilling is complete, remove temporary timber matting and all construction debris and restore original grades.	• **Minimizes** efforts to achieve post-construction restoration to pre-construction contours.
• Restoration activities shall begin immediately after backfilling. Temporarily revegetate all impacted wetlands in accordance with plan sheet ES-0.05 to allow rapid stabilization and deter invasive species.	• **Minimizes** the duration of temporary disturbances to the wetland. • **Avoids** erosion of topsoil with native plant seedbank/root structures. • **Minimizes** the potential for establishment of invasive and exotic species in the wetland.
• Permanently revegetate impacted palustrine emergent (PEM) wetlands in accordance with plan sheet ES-0.05 that calls for Ernst Conservation Seed Mix No. ERNMX-122 Facultative Wet (FACW) Meadow Mix. Plant during the recommended planting season.	• **Minimizes** the duration of temporary disturbances to the wetland. • **Minimizes** the potential for erosion of topsoil with native plant seedbank/root structures. • **Minimizes** the potential for establishment of invasive and exotic species in the wetland.
• Temporary or permanent revegetation is not necessary in areas of standing water.	• **Avoids** transport of temporary or permanent vegetation to downstream areas where establishment of vegetation might not be appropriate.
• No soil amendments, lime, fertilizer or binding agents are to be used in wetland areas.	• **Avoids** altering wetland soil and water chemistry which could impede successful restoration.

	• **Avoids** the potential for water quality degradation in wetland that could change plant and aquatic fauna composition. • **Avoids** the potential for downstream water quality degradation.
• 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.	• **Minimizes** the duration of temporary disturbances to the wetland. • **Minimizes** the potential for establishment of invasive and exotic species in the wetland.
• Impacted PSS wetland areas where the root system was not removed (e.g., matted over) do not require replanting.	• In-tact root system **avoids** erosion and sedimentation.
• 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.	• **Minimizes** the duration of temporary disturbances to the wetland. • **Minimizes** the potential for establishment of invasive and exotic species in the wetland.
• PSS and PFO restoration areas will be protected with "no-mow" signs or other restrictive barriers as determined by SPLP.	• **Avoids** conversion of restored shrub or forested wetlands to herbaceous wetlands. • Prevents mowing from occurring within these areas, to **avoid** habitat disturbance in the restored shrub and forested wetlands.
• Monitor all wetlands for successful restoration.	• Ensures successful restoration in wetlands, thereby **minimizing** the duration of temporary disturbances to wetlands and **avoiding** loss of wetland cover type values and functions.

Project-Wide Waterbody Crossing Impact Avoidance and Minimization Measures

The following Impact Avoidance, Minimization, and Mitigation Procedures apply to use of the open trench construction method across streams on a programmatic, project-wide, and site-specific basis.

Best Management Practice (Measure)	**Impact Avoidance and Minimization**
Expedited Construction – 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 durations of the stream crossings are indicated within the E&S Plan notes/details.	• Expediting waterbody construction activities to the shortest duration practicable **minimizes all potential direct and indirect impacts** associated with the crossing, including but not limited to: establishment of temporary equipment bridge and travel lane, in-stream bed/bank/bed trenching (excavation), segregation of native stream materials, dewatering, discharge of trench water, backfiling, return and stabilization of pre-construction contours and hydrology, and restoration and revegetation.
Timing Restrictions – The time of year of in-stream work at waterbody crossings shall be restricted in accordance with correspondences with the PAFBC. All of the most current trout stream restrictions assembled directly from these correspondences are noted on the E&S Plans and aerial site plans.	• Compliance with agency-required time of year in-stream restrictions **avoids and/or minimizes** potential in-stream and downstream direct and indirect impacts on protected trout species and other aquatic life.
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.	• **Avoids and/or minimizes** potential in-stream and downstream direct and indirect impacts on protected trout species and other aquatic life.

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.	• **Avoids and/or minimizes** in-stream and downstream direct and indirect impacts on protected trout species and other aquatic life.
Dry Waterbody Construction Methods (Open Cut) – The following is a list of dry crossing construction methods generally applicable for all stream crossings that will be open-cut:	
• Dry crossing construction methods will be used at every open cut stream crossing on the PPP Project. 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.	• **Avoids** in-stream construction under wet open trench conditions Project-wide and **minimizes** potential downstream turbidity and suspended sediment and potential resultant temporary and minor (not significant or adverse) indirect impacts on the aquatic environment associated with the wet open trench construction method.
• 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.	• Ensures selection and use of the most applicable dry crossing construction method based on site-specific stream hydrography conditions at the time of construction, and thereby **avoids and minimizes** in-stream disturbance and **minimizes** the duration of the construction period.
• 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.	• Expediting waterbody construction activities to the shortest duration practicable based on stream channel width **minimizes all potential direct and indirect impacts** associated with the crossing.
• 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.	• **Minimizes** potential downstream turbidity and suspended sediment and potential resultant temporary and minor (not significant or adverse) indirect impacts on the aquatic environment associated with the pumped water. • **Avoids** deleterious materials from assembly areas, temporary equipment, and non-hazardous material storage areas from contaminating streambeds/banks.
• Install temporary equipment crossings at streams and temporary timber mats at wetland crossings in accordance with notes and details	• **Avoids and/or minimizes** use of equipment in streams, thereby **avoiding/minimizing** rutting of streambed/banks, soil compaction, and potential turbidity and suspended sediment and resultant temporary and minor (not significant or adverse) indirect impacts on the aquatic environment. • **Avoids** direct rutting of wetland soils and **minimizes** wetland soil compaction, thereby **minimizing** efforts to achieve post-construction restoration to pre-construction contours.
• For dry stream crossings, install pump bypass, dry flume, or cofferdam in accordance with notes and details.	• **Avoids** altering stream flow during construction by maintaining downstream flow and avoids potential restricted flow impacts on resident aquatic life.

	• Isolate construction area, thereby **minimizing** potential suspended sediment and turbidity during excavation/installation of pipeline.
• 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.	• **Minimizes** potential downstream turbidity and suspended sediment and potential resultant temporary and minor (not significant or adverse) indirect impacts on the aquatic environment associated with the pumped water.
• Waterbars shall be placed 50 feet from top of bank except as noted on E&S Plan site-specific plan drawings.	• Diverts potential stormwater overland flow from adjacent disturbed upland slopes to **avoid** erosion and **minimize** potential discharge of turbidity and suspended sediment to adjacent or nearby stream and associated impacts on resident aquatic life.
• Mark the top of streambank with highly visible flagging and post “Protected Resource” and “No Refueling” signs within 100 feet of top of streambank.	• Clearly demarcates streambank boundaries to **avoid** potential encroachment of construction activities in streams. • **Avoids** contamination in surface waters and soils of streams.
• Material storage areas shall be located at least 100 feet back from top of streambank.	• **Minimizes** the potential for debris and contaminants from storage areas to reach streams.
• 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.	• **Minimizes** the duration of soil disturbance and **minimizes** stormwater event overland flow from adjacent riparian areas from discharging turbidity and sedimentation to the stream. • **Minimizes** alteration of adjacent riparian area grade, hydrology, and vegetation root stock. • **Minimizes** the potential for unsuccessful restoration in riparian areas and **minimizes** efforts to achieve post-construction restoration of riparian area pre-construction contours and vegetation.
• 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).	• Use of prefabricated materials **minimizes** the duration of in-stream dam construction activities to the shortest duration practicable and thereby **minimizes** potential direct and indirect turbidity and sedimentation impacts associated with these activities. • Use of impervious liner **avoids** stream bottom disturbance and associated turbidity and sedimentation during in-stream activities.
• 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.	• **Minimizes** loss of native stream be material, **avoids** need for foreign fill and associated potential introduction of invasive species, contamination, or incompatible materials to the stream bed, thereby **minimizing** efforts to achieve post-construction restoration.
• All excess excavated material shall be removed from the stream floodway prior to permanently stabilizing stream banks.	• **Avoids** potential transport of excavated material from floodway into stream and associated in-stream and downstream turbidity and suspended sediment. • **Avoids** alteration of floodway contours and associated floodway functions (flood water transport, storage, desynchronization, etc.).
• 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.	• **Minimizes** the duration of disturbed and exposed soils in riparian areas and stream banks to the shortest duration practicable and thereby **minimizes** potential direct and indirect turbidity and sedimentation impacts associated with in-stream construction activities. • Avoids and/or minimizes the potential for unsuccessful restoration in riparian areas and stream banks and **minimizes** efforts to achieve post-construction stabilization and restoration of pre-construction contours and vegetation.

• Remove all construction material and structures from the waterbody after pipeline installation.	• **Avoids** permanent impacts to in-stream hydrography and flow conditions, **avoids** potential indirect impacts to resident aquatic life, and **minimizes** efforts to achieve post-construction stabilization and restoration of stream bed and bank pre-construction contours and vegetation.
• Keep lime and fertilizers out of the stream.	• **Avoids** potential alteration of in-stream water quality conditions (pH, artificial nutrification, algal blooms, etc.) and associated impacts on resident aquatic life.
• Stabilize channel excavation and stream banks prior to redirecting stream flow in the stream.	• **Avoids and/or minimizes** potential in-stream turbidity and suspended sediment and associated impacts on resident aquatic life. • **Avoids** permanent impacts to in-stream hydrography and flow conditions, **avoids** potential indirect impacts to resident aquatic life, and **minimizes** efforts to achieve post-construction stabilization and restoration of stream bed and bank pre-construction contours and vegetation.
Additional Dam and Pump Bypass Method Measures – 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, and is often used in streams with curved or meandering channels where effective placement of a straight flume pipe is not feasible. Additional impact avoidance, minimization, and mitigation measures for the dam and pump bypass method include:	• **Avoids** in-stream construction under wet open trench conditions and **minimizes** potential downstream turbidity and suspended sediment and potential resultant temporary and minor (not significant or adverse) indirect impacts on the aquatic environment associated with the wet open trench construction method.
• Construct waterbody crossings as perpendicular to the axis of the waterbody channel as engineering and routing conditions allow.	• **Avoids or minimizes** areal extent of construction right-of-way and in-stream activities to the minimum practicable to construct the crossing. • **Minimizes** all potential direct and indirect impacts associated with the crossing.
• The pump should have twice the pumping capacity of the anticipated flow.	• **Avoids or minimizes** potential interruption of ambient downstream flow volumes and potential associated impacts on resident aquatic life and downstream water users.
• Contractor shall ensure that a sufficient number of backup pumps are available at the site to maintain twice the pumping capacity of anticipated flow.	• **Avoids** potential interruption of ambient downstream flow volumes and potential associated impacts on resident aquatic life and downstream water users.
• Install upstream dam and then downstream dam. Keep pump running to maintain stream flow (see Detail 13 ES-0.07).	• **Avoids or minimizes** potential interruption of ambient downstream flow volumes and potential associated impacts on resident aquatic life and downstream water users.
• 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.	• **Avoids** incidental disturbance to native stream bed materials and associated turbidity and suspended sediment, and incidental impacts to resident marcoinvertebrates and other aquatic life. • **Avoids** incidental entrainment and impingement of resident fish and other macro aquatic life.
• An energy dissipater is required at the discharge of the bypass pumps.	• **Avoids** incidental scouring of native stream bed materials, direct scouring impacts to resident aquatic life, and indirect turbidity and suspended sediment and associated impacts on resident aquatic life. • **Avoids** loss of native stream bed materials and **minimizes** efforts to achieve post-construction stabilization and restoration of stream bed and bank pre-construction contours

• Restore stream channels and bottoms to their preconstruction contours or better, and stabilize channel prior to re-establishing flow.	• **Avoids and/or minimizes** potential in-stream turbidity and suspended sediment and associated impacts on resident aquatic life. • **Avoids** permanent impacts to in-stream hydrography and flow conditions, **avoids** potential indirect impacts to resident aquatic life, and **minimizes** efforts to achieve post-construction stabilization and restoration of stream bed and bank pre-construction contours and vegetation.
Waterbody Restoration Methods (Open Cut) – The following is a list of restoration methods generally applicable for all waterbody crossings that will be open-cut:	
• Stream restoration activities are detailed in the various stream crossing methodologies indicated in Section 8.2 of the Procedures.	• See above stream restoration measures under **Additional Dam and Pump Bypass Method Measures.**
• Native stream bed material will be separated from other spoil for reinstallation after restoration.	• **Minimizes** loss of native stream be material, **avoids** need for foreign fill and associated potential introduction of invasive species, contamination, or incompatible materials to the stream bed, thereby **minimizing** efforts to achieve post-construction restoration.
• 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.	• **Avoids or minimizes** permanent impacts to stream bed and bank contours, hydrography, and flow. • **Avoids or minimizes** potential for long-term or permanent bed and bank instability, generation of turbidity and sedimentation, and associated impacts on resident aquatic life. • Use of native and clean rip rap materials **avoids** the use of foreign fill that may introduce invasive species, contamination, or incompatible materials to the stream bed, thereby **minimizing** efforts to achieve post-construction restoration.
• For open-cut crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing instream construction activities.	• **Avoids and/or minimizes** potential in-stream turbidity and suspended sediment and associated impacts on resident aquatic life. • **Avoids** permanent impacts to in-stream hydrography and flow conditions, **avoids** potential indirect impacts to resident aquatic life, and **minimizes** efforts to achieve post-construction stabilization and restoration of stream bed and bank pre-construction contours and vegetation.
• For dry-ditch crossings, complete stream bed and bank stabilization before returning flow to the waterbody channel.	• **Avoids and/or minimizes** potential in-stream turbidity and suspended sediment and associated impacts on resident aquatic life. • **Avoids** permanent impacts to in-stream hydrography and flow conditions, **avoids** potential indirect impacts to resident aquatic life, and **minimizes** efforts to achieve post-construction stabilization and restoration of stream bed and bank pre-construction contours and vegetation.
• 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.	• **Minimizes** loss of native stream be material, **avoids** need for foreign fill and associated potential introduction of invasive species, contamination, or incompatible materials to the stream bed, thereby **minimizing** efforts to achieve post-construction restoration.

• Return waterbody banks to preconstruction contours or to a stable angle of repose as approved by the EI.	• **Avoids** permanent impacts to in-stream hydrography and flow conditions by stabilizing stream banks, **avoids** potential indirect impacts to resident aquatic life, and **minimizes** efforts to achieve post-construction stabilization and restoration of stream bed and bank pre-construction contours and vegetation.
• 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.	• **Avoids** permanent impacts to in-stream hydrography and flow conditions by stabilizing stream banks, and **minimizes** efforts to achieve post-construction stabilization and restoration of stream bank pre-construction contours and vegetation. • Use of suitable bank stabilization materials **avoids** incidental entrapment and mortality of sensitive wildlife species (amphibians, reptiles, small mammals) along stream banks.
• 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.	• **Avoids or minimizes** permanent impacts to stream bed and bank contours, hydrography, and flow. • **Avoids or minimizes** potential for long-term or permanent bed and bank instability, generation of turbidity and sedimentation, and associated impacts on resident aquatic life. • Use of the minimum extent of rip rap necessary **minimizes** the duration and areal extent of in-stream bank stabilization activities and potential associated impacts on the in-stream environment, water quality, and resident aquatic life. • Use of native and clean rip rap materials **avoids** the use of foreign fill that may introduce invasive species, contamination, or incompatible materials to the stream bed, thereby **minimizing** efforts to achieve post-construction restoration.
• Revegetate disturbed riparian areas with native species as set forth in the E&S Plan.	• Revegetation and associated stabilization of adjacent disturbed riparian areas **minimizes** potential temporary and **avoids** potential permanent erosion of upland soils and associated in-stream turbidity and suspended sediment. • Revegetation with native species **minimizes** the potential for establishment of invasive and exotic species in the riparian area.
• If rip-rap is used, natural streambed material is to be restored throughout and overtop the rip-rap where feasible.	• Overtopping clean rip rap materials with native materials **avoids** the use of foreign fill that may introduce invasive species, contamination, or incompatible materials to the stream bed, thereby **minimizing** efforts to achieve post-construction restoration.
• 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).	• Diverts potential stormwater overland flow from adjacent disturbed upland slopes to **avoid** erosion and **minimize** potential discharge of turbidity and suspended sediment to adjacent or nearby stream and associated impacts on resident aquatic life.
• In some areas, with the approval of the EI, an earthen berm might be suitable as a sediment barrier adjacent to the waterbody	• With EI inspection and authorization, diverts potential stormwater overland flow from adjacent disturbed upland slopes to **avoid** erosion and **minimize** potential discharge of turbidity and suspended sediment to adjacent or nearby stream and associated impacts on resident aquatic life.
• Some stream banks might be atypical (e.g., vertical banks, low banks, eroding banks). In such	• **Avoids** permanent impacts to in-stream hydrography and flow conditions by stabilizing stream banks,

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.	**avoids** potential indirect impacts to resident aquatic life, and **minimizes** efforts to achieve post-construction stabilization and restoration of stream bed and bank pre-construction contours and vegetation.

Resultant Programmatic Impacts Not Significant or Adverse

As presented in the original Project-wide Alternatives Analysis (see Section 5.3), and as set forth in the Chapter 105 permit application Project Impact analyses (Attachment 11: Enclosure D, and Enclosure E, Part 2), implementation of the Project as proposed, including the proposed best management practices presented in the Impact Avoidance, Minimization, and Mitigation Procedures and Erosion & Sedimentation Control Plan, would result in temporary and minor impacts to wetlands and associated wetland functions and values, as well as to streams. The resultant impacts are not considered significant or adverse, and thus do not require compensatory mitigation. This conclusion applies to the Glen Riddle/0602 HDD Reroute as well.

Additional Site-Specific Impact Avoidance and Minimization Measures

As presented in the major modification request revised Erosion & Sedimentation Control Plan (ES-6.20), SPLP proposes to use an open cut construction method at WL-I1 and an open cut construction method with a dam and pump bypass at S-I2, both with the implementation of the applicable best management practices (measures) summarized above. As presented on ES-6.20 for the S-I2 crossing, SPLP also plans to leave existing riprap installed during previous construction activities in place (undisturbed) to the maximum extent practicable, restore existing riprap that would be disturbed after installation of the 20-inch pipeline, and avoid installation of additional riprap that was previously proposed (leave existing stream bed and banks undisturbed) where the construction right-of-way width and in-stream construction activities have been minimized along the western portion of the S-I2 construction right-of-way.

Conclusion

In conclusion, given the IRs that occurred during the initial HDD attempt, SPLP has elected to utilize an alternate method of installation. Alternative routes were evaluated but were not considered favorable as they could likely result in more permanent impacts to environmental resources, as well as human environment resources (i.e., residential and developed areas). In addition, alternative construction methods were considered but were determined to be neither technically feasible nor practicable. Therefore, the professional opinion of the HDD Reevaluation Team, consisting of the Geotechnical Evaluation Leader, Professional Geologists, Professional Engineers, and other construction specialists, is that the use of an open cut construction method with a dam and pump bypass in place for the stream crossing will have the least impact to environmental resources, as the wetland area and stream flow will be managed in accordance with all permit conditions (dam and pump) and can completed in the most efficient and timely manner, including restoration/stabilization of all resources. Moreover, use of the open cut construction method is the only technically feasible, and therefore the only practicable, alternative within the existing permitted right-of-way taking into consideration existing technology and logistics, including safety.

Alternatives Analysis Compliance Summary

Use of the proposed open cut construction method with the implementation of SPLP's Project-wide and site-specific impact avoidance and minimization measures will result in impacts to WL-I1 and S-I2 that will be minor and temporary, and are considered not significant or adverse, and will further avoid or minimize impacts to the wetland (and stream) environment to the maximum extent practicable and be in compliance with applicable alternatives analysis regulations.

Specifically, the subject wetland WL-I1 is classified as a non-EV or "other" wetland, therefore the applicable regulation is 25 Pa. Code § 105.18(b). The following table provides a summary of how the proposed open cut construction method crossing of WL-I1 complies with these regulations.

Applicable Regulation	**Compliance Statement**
25 Pa. Code § 105.18(b): *Other wetlands*. Except as provided for in subsection (c), the Department will not grant a permit under this chapter for a dam, water obstruction or encroachment in, along, across or projecting into the wetland which is not an exceptional value wetland, or otherwise affecting the wetland, unless the applicant affirmatively demonstrates in writing and the Department issues a written finding that the following requirements are met:	
(1) The project will not have a significant adverse impact on the wetland, as determined in accordance with §§ 105.14(b) and 105.15. The determination of whether an adverse impact is significant includes an evaluation of the following factors:	The implementation of SPLP's Project-wide and site-specific impact avoidance and minimization measures will result in no significant or adverse impact on WL-I1, as demonstrated by evaluation of the following factors:
(i) The areal extent of the wetland impacts.	The proposed areal extent of wetland impact to WL-I1 has been minimized to the extent practicable (0.392 acre) by narrowing the construction right-of-way to 50 feet across the wetland, use of temporary timber mat travel lane to further reduce the areal extent of ground disturbance, setback of additional temporary workspace outside of the wetland, in addition to other impact avoidance and minimization measures.
(ii) The wetland's values and functions.	WL-I1 will be restored to pre-construction contours and hydrology, wetland topsoil restored at top of trench, wetland ground surface stabilized and revegetated with native vegetation, and thus result in no adverse impact on existing wetland values and functions.
(iii) Whether the affected wetlands values and functions are unique to the area or region.	WL-I1 is a non-EV/"other" PEM wetland, which is a common wetland type not unique to the area or region. WL-I1 is further situated within an existing, maintained, pipeline right-of-way containing multiple (up to three) existing buried pipelines and other infrastructure, and does not possess values and functions unique to the area or region.
(iv) Comments from other State and Federal environmental agencies concerning the scope and effect of the impact.	WL-I1 construction right-of-way is located adjacent to the north of potential redbelly turtle habitat, and per PAFBC construction and restoration activities will be performed in compliance with agency-required protection measures (see Note 5 on ES-6.20).
(2) Adverse environmental impacts on the wetland will be avoided or reduced to the maximum extent possible.	As summarized in **Other Impact Avoidance and Minimization Measures**, SPLP incorporated numerous programmatic routing/siting and over 40 industry-standard and agency required or recommended impact avoidance and minimization best management practices (construction and restoration procedures or measures) for wetland crossings, which have been applied on a programmatic, project-wide, and site-specific basis on the PPP Project. Implementation of these measures will result in impacts that are minor and temporary, considered not significant or adverse, and avoid or minimize environmental impacts to the maximum extent practicable.
(3) There is no practicable alternative to the proposed project that would not involve a wetland or that would have less adverse impact on the wetland, and that would not have other significant adverse impacts on the environment. An alternative is practicable if it is available and capable of being carried out after taking into consideration construction cost, existing technology and logistics. An area not presently	Use of the proposed open cut construction method is the only technically feasible, and therefore the only practicable, alternative taking into consideration existing technology and logistics for the crossing of WL-I1 within the existing right-of-way.

owned by the applicant which could reasonably be obtained, utilized, expanded or managed to fulfill the basic purpose of the proposed project shall be considered as a practical alternative.	
(i) It shall be a rebuttable presumption that there is a practicable alternative, not involving a wetland, to a nonwater-dependent project, and that the alternative would have less adverse impact on the wetland.	Use of the proposed open cut construction method is the only technically feasible, and therefore the only practicable, alternative taking into consideration existing technology and logistics for the crossing of WL-I1 within the existing right-of-way.
(ii) To rebut the presumption, an applicant for a permit under this chapter shall demonstrate with reliable and convincing evidence and documentation and the Department will issue a written finding that the following statements are true:	The implementation of SPLP's Project-wide and site-specific impact avoidance and minimization measures and use of the proposed open cut construction method will result in no significant or adverse impact on WL-I1, and minimize environmental impacts to the maximum extent practicable, and as demonstrated by evaluation of the following factors:
(A) The basic project purpose cannot be accomplished utilizing one or more other sites that would avoid, or result in less, adverse impact on the wetland.	Use of the proposed open cut construction method is the only technically feasible, and therefore the only practicable, alternative taking into consideration existing technology and logistics for the crossing of WL-I1 within the existing right-of-way.
(B) A reduction in the size, scope, configuration or density of the project as proposed and alternative designs to that of the project as proposed that would avoid, or result in fewer or less severe, adverse impacts on a wetland will not accomplish the basic purpose of the project.	As summarized in **Other Impact Avoidance and Minimization Measures**, SPLP incorporated numerous programmatic routing/siting and over 40 industry-standard and agency required or recommended impact avoidance and minimization best management practices (construction and restoration procedures or measures) for wetland crossings, which have been applied on a programmatic, project-wide, and site-specific basis on the PPP Project. Implementation of these measures will result in impacts that are minor and temporary, considered not significant or adverse, and avoid or minimize environmental impacts to the maximum extent practicable.
(4) The project will not cause or contribute to a violation of an applicable State water quality standard.	As summarized in **Other Impact Avoidance and Minimization Measures**, SPLP incorporated numerous programmatic routing/siting and over 40 industry-standard and agency required or recommended impact avoidance and minimization best management practices (construction and restoration procedures or measures) for wetland crossings, which have been applied on a programmatic, project-wide, and site-specific basis on the PPP Project. Implementation of these measures will result in impacts that are minor and temporary, considered not significant or adverse, and will not cause or contribute to a violation of an applicable State water quality standard.
(5) The project will not cause or contribute to pollution of groundwater or surface water resources or diminution of the resources sufficient to interfere with their uses.	As summarized in **Other Impact Avoidance and Minimization Measures**, SPLP incorporated numerous programmatic routing/siting and over 40 industry-standard and agency required or recommended impact avoidance and minimization best management practices (construction and restoration procedures or measures) for wetland crossings, which have been applied on a programmatic, project-wide, and site-specific basis on the PPP Project. Implementation of these measures will result in impacts that are minor and temporary, considered not significant or adverse, and will not cause or contribute to pollution of groundwater or surface water resources or diminution of the resources sufficient to interfere with their uses.

(6) The cumulative effect of this project and other projects will not result in a major impairment of this Commonwealth's wetland resources.	As demonstrated in the original Chapter 105 permit application, Cumulative Impacts Analysis, based on the aggregate (i.e., cumulative) impacts of the PPP Project and other potential or existing SPLP projects and other projects evaluated within the Cumulative Impact Analysis Area, the wetland impacts associated with all the Chapter 105 applications related to this Project, in consideration of interrelated wetland areas (inclusive of adjacent streams), will not result in the impairment of the Commonwealth's EV wetland resources or a major impairment of the Commonwealth's other wetland resources.
(7) The applicant will replace the affected wetlands to compensate for unavoidable impacts, in accordance with § 105.20a.	The proposed WL-I1 wetland crossing will not involve permanent dredge/fill activities (loss) or the permanent conversion of PFO wetland cover type, and therefore does not require compensatory mitigation.

ATTACHMENT C

Environmental Assessment

Revised June 2020

Environmental Assessment (E.A. Form) Rev. 6/2017

March 2019
Revised June 2020

Note: The EA provided herein provides information relevant to the major permit modification required at the Glen Riddle/0620 HDD Modification in Delaware County, Pennsylvania, and includes specific excerpts and information previously submitted by Sunoco Pipeline L.P. as part of the approved Pennsylvania Pipeline Project (PPP) Chapter 105 Joint Permit (E23-524).

Module S1: Project Summary

S1.A Overall Project Description

Sunoco Pipeline L.P. (SPLP) requests a major permit modification for a change in the installation method for both the 20-inch and portions of the 16-inch diameter pipelines previously permitted as the 0620 Horizontal Directional Drill (HDD) in Middletown Township, Delaware County. This permit request is to convert the HDD to a direct pipe through the residential areas at Riddlewood Drive and Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, a conventional auger bore under Glen Riddle Road, and conventional open trench construction through Wetland WL-11 and Stream S-I2. During the pilot hole drilling phase on the permitted 0620 HDD for the 16-inch pipeline installation through this area, there were several inadvertent returns (IRs) in which drilling mud/fluid entered Waters of the Commonwealth, three unnamed tributaries to Chester Creek (Streams S-I1, S-I2, and S-I3) and a Wetland (WL-I1). In order to address these IRs (contain and clean-up), SPLP installed sand bag containments, flumes, and pump arounds. In addition, groundwater was encountered at the eastern end of the HDD, near Stream S-I2 resulting in dewatering issues and safety concerns in the pits. Therefore, given SPLP's experience during the 16-inch HDD at this location, SPLP has elected to install the pipelines via an alternate installation method that minimizes impacts to Waters of the Commonwealth.

This permit modification requests the conversion of an approximate 0.66-mile (3,500 feet) HDD to a combination of direct pipe, conventional bore, and open cut installation methods for the 20-inch and portions of the 16-inch diameter pipelines. The new installation method will involve the open cut of Wetland WL-I1~~, an Exceptional Value (EV) wetland,~~ to install both pipes and an open cut to install the 20-inch pipe across Stream S-I2. In addition, the overlapping floodways of streams S-I1, S-I2, S-I3, and S-I4 will be crossed via open cut (refer to *Attachments C (Module 2) and E* for additional information about these water resources). An open trench installation method across these resources will result in temporary, short term impacts to streams and wetlands, but will eliminate the risk of uncontrolled discharges associated with IRs and facilitate restoration of areas where IR containment measures remain or were implemented in these resources.

Stream S-I2 will be crossed in accordance with PPP's original Chapter 105 Joint Permit Application utilizing one of the following open-trench excavation methods for installation of the pipeline across waterbodies (refer to the E&S Plan standard typical drawings for details):

- **Dry Open Cut** - Minor waterbodies with no flow at the time of construction may be crossed using the open-cut crossing method.
- **Dry Flume** – A flumed crossing directs and contains the stream flow through an alternate mechanism across the stream channel to allow for the trenching and pipe installation to occur in dry conditions. Where practical, this allows for drier trenching, pipe installation, and restoration while maintaining continuous downstream flow.
- **Dry Pump Bypass** - The dam and pump bypass method may be used for crossings of waterbodies where pumps can adequately transfer stream flow volumes around the workspace. Similar to the flume crossing, this method allows for drier trenching, pipe installation, and restoration while maintaining continuous downstream flow.

- **Dry Cofferdam** – The cofferdam method, typically used on large streams/rivers, involves the installation of a cofferdam to isolate and divert flow around the workspace in two phases. The first phase consists of the cofferdam installation on one of the banks and approximately halfway 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. This method allows continuous flow around the workspace and eliminates concerns about sensitive species passage.

The selected open cut, dry stream crossing method will convey stream flow across the workspace and outlet downstream within the permitted limit-of-disturbance, such that work will be conducted in a dry stream channel. After the stream flow is contained and directed/conveyed across the work area, the trench will be excavated, and the 20-inch pipe will be installed via the open trench method through the stream in accordance with all permit conditions and requirements. In order to efficiently complete all construction activities and minimize resource impacts, SPLP is proposing a 50-foot-wide limit of disturbance (LOD) across the perennial stream (S-I2).

Wetland WL-I1 will be crossed via the open trench method for both the 20 and 16-inch pipelines in accordance with all applicable permit conditions and requirements. In order to efficiently complete all construction activities and install both pipes at the same time through Wetland WL-I1 while minimizing the duration of construction and maintaining safety standards for working near "hot lines", SPLP is requesting an approximately 110-foot wide LOD through the PEM portion of WL-I1: the LOD width will be reduced, where necessary, to ensure there will be no impact to the PFO portion of this ~~EV~~ wetland. A large portion of the requested LOD in wetland WL-I1 is currently disturbed as part of the Mariner East 1 valve station upgrades as well as the approved restoration efforts associated with the previous IRs in this area.

Timber mats and bridges will be placed within the travel lane where the wetland and stream are crossed to avoid soil compaction, allow for trench excavation, segregation of the wetland topsoil and stream substrate material, and stockpiling of excavated materials in adjacent upland areas. Once the pipes and appropriate trench plugs are installed, the trench will be backfilled, and restored to pre-existing elevations and hydrology, and revegetated. All work will be conducted in accordance with permit conditions/requirements as well as the revised/updated Erosion & Sediment and Restoration plan (refer to *Attachment D* of this permit modification). The requested modification will not result in any loss of wetland area or water quality/quantity, and the localized resource impacts are considered minor and temporary as they will be restored to their pre-existing condition (vegetation, hydrology, and grade).

CEA Requirements

Per PADEP Technical Policy Guidance Document No. 310-2137-006, a Comprehensive Environmental Assessment that analyzes the alternatives, impacts, mitigation and antidegradation for all structures and activities associated with the overall Project was included with the original PPP Chapter 105 Joint Permit Application submitted to PADEP (E23-524. APS 879056). Specifically, Attachment 11 EAF, Enclosure E Part 3 addresses alternatives; Part 2 includes impacts; Part 4 identifies impact avoidance minimization and mitigation; and Part 5 discusses antidegradation.

Information applicable to this specific permit modification request are presented in this submittal as follows:

- Alternatives – Module S3, S3.F
- Impacts – Module S3, S3.B
- Avoidance, Minimization, and Mitigation – Module S4
- Antidegradation – Module S3, S3.E

S1.B Project Purpose, Need, Water Dependency, and Summary of Resources and Impacts

Project Purpose & Need

As presented in the original PPP Chapter 105 Joint Permit (E23-524), the overall Project will provide transportation service of natural gas liquids (NGLs) with the combined pipelines from the Utica and Marcellus Shale formations for both domestic and international markets. NGLs are separated from the natural gas stream before consumer ready (dry) natural gas is shipped on the natural gas pipeline network. Upstream shippers are currently limited by the shortage of NGL transport systems. In addition, the Project will provide various delivery points to local Pennsylvania distributors for supply of needed propane supplies, at affordable prices, for use as heating and/or cooking fuel by consumers in Pennsylvania and neighboring states, increasing fuel access and supply during peak demand periods when supplies would otherwise become short. Butane will also be shipped to local markets as a component of gasoline to ensure gasoline suppliers can meet seasonal vapor pressure restrictions.

Water Dependency

As presented in the original PPP Chapter 105 Joint Permit (E23-524), constructing and operating a natural gas liquids pipeline is not, per se, a water-dependent project. However, because of Pennsylvania's abundant water and wetland resources, any project which travels approximately 300 miles west to east across the Commonwealth requires the crossing of, and therefore access to, waters and wetlands. The overall Project requires access and proximity to and siting in, on, over or under waters and wetlands in order to achieve its primary purpose to transport natural gas liquids from Houston, Washington County to SPLP's existing facility in Marcus Hook, Delaware County. Therefore, the linear nature and approximately 300-mile length of the Project across 17 counties west to east in Pennsylvania makes the Project water-dependent.

Summary of Resources & Impacts

The impacts associated with the Glen Riddle/0620 HDD permit modification will result in approximately 0.20 acre of permanent and 0.19 acre of temporary wetland impacts, approximately 0.01 acre of permanent and no temporary stream impacts, and approximately 0.32 acre of permanent and 0.14 acre of temporary floodway impacts [Note: additional information related to the impact calculations is provided in *Attachment E*]. Although PADEP defines pipeline operation and maintenance activities as permanent impacts, the impacts are considered minor/localized and temporary as the entire disturbed area of the streams will be restored to preconstruction conditions (i.e., elevation, flow, stream substrate, stream banks, hydrologic conditions, etc.). Furthermore, the resource crossings will not involve any permanent fill; the streams will not be relocated, and there will be no permanent loss of streams or aquatic habitat associated with the

reroute modification request. Please refer to *Attachment E* of this permit modification request packet for an updated Aquatic Resource Impact Table.

The open cut/bore crossing would cross ~~a~~ one (1) wetland ~~classified as EV because it is located within 0.5 mile upstream of a known public or private water drinking supply. SPLP~~ and will restore the disturbed ~~EV~~ wetland to its pre-existing condition such that surface water hydrology is restored and the re-establishment of hydrophytic vegetation is facilitated. SPLP will also implement E&S best management practices (BMPs) ~~including the appropriate antidegradation best available combination of technologies (ABACT) measures for the EV wetland~~. No long-term impacts to this resource are anticipated.

The proposed modification would cross streams designated under the Drainage List A of Pennsylvania Code, Title 25, Chapter 93, § 93.9h as Trout Stocked (TSF) or drains to TSF and Migratory Fishes (MF) and designated by the PA Fish and Boat Commission (PAFBC) as approved trout waters (ATW) or drains into ATW streams, and stocked trout streams (STS). Accordingly, SPLP will comply with timing window restrictions/limitations (i.e., 3/1 through 6/15 for ATW) during construction and will work with the appropriate agencies to avoid and minimize potential impacts to trout/spawning/migrating fish.

In addition, an updated Pennsylvania Natural Diversity Index (PNDI) review (PNDI-677014) identified potential impacts to a sensitive species within the general area of the proposed modification. Specifically, the PA Fish and Boat Commission (PFBC) identified the Eastern Redbelly Turtle (*Pseudemys rubriventris)*, a state-listed Threatened Species, and required further review of the proposed modification. SPLP provided information to the PFBC regarding the proposed Glen Riddle/ 0620 HDD modification on February 13, 2019. A clearance letter was received from PFBC on March 6, 2019. Per PFBC's recommended avoidance measures, SPLP will maintain a barrier between the Project LOD and Chester Creek, and conduct pre-constructions surveys for the Eastern Redbelly Turtle. In addition, should any Eastern Redbelly turtles be found, SPLP will contact the PFBC within 48 hours and document the turtle found onsite and relocate the turtle to the nearest aquatic habitat. With implementation of these avoidance measures, potential impacts to the Eastern Redbelly Turtle are not anticipated. For further information, please refer to Module 2, S2.C of this Environmental Assessment and *Attachment G* of this permit modification request packet for the updated PNDI and agency coordination.

Module S2: Resource ID & Characterization

S2.A Location Map & Wetland Delineation Report

The original location of the Project is provided in the Location Map prepared and submitted for the Project's Chapter 105 Joint Permit Application for Delaware County. The applicable page from the original application is provided in Appendix S2.A-1 and has been modified to reflect the location of the Project with the proposed Glen Riddle/0620 HDD permit modification as well as the locations of the wetland and streams, including floodways affected.

Similarly, an *Aquatic Resources Report* for Delaware County was prepared in August 2015 and submitted as part of the PPP Chapter 105 Joint Permit Application. The Aquatic Resources Report presents the results and conclusions of wetland and stream identification activities completed for the entire Project right-of-way. Excerpts from the Aquatic Resources Report (prepared in August 2015) including information on Wetland WL-I1 and Stream S-12 (including floodways) and a supplemental Aquatic Resources Report (prepared in March 2016) including information on an extended portion of Stream S-12 are included as Appendix S2.A-2.

One public water supplier's (PWS) groundwater well was identified within 0.5 mile of the Project site at the Aqua PA PWS source and/or facility. SPLP sent a letter notification requesting additional information to the PWS on September 20, 2016 as part of the Project's Chapter 105 Joint Permit Application for Delaware County. The proposed open cut installation method is not anticipated to have an impact on groundwater resources or surface water quality and is not expected to impact this PWS. Nonetheless, SPLP notified Aqua PA on March 18, 2019 of the proposed permit modification, including revised site plans, which is provided in Appendix S2.A-4.

S2.B Aquatic Resources

For this permit modification request, SPLP identified all aquatic resources present within the Project area and the resources that could be affected by the proposed modification including one wetland and four streams. The proposed modification includes open cut crossing of one wetland and one stream, as well as the floodways of four streams.

The aquatic resources that would be affected have been identified as Wetland WL-I1 and Streams S-I2 (an unnamed tributary to [UNT] Chester Creek), S-I1 (UNT to Chester Creek), Stream S-I3 (UNT to Chester Creek), and Stream S-I4 (Chester Creek).

Wetland WL-I1, within the proposed modification LOD, is a palustrine emergent (PEM) wetland cover type with dominant vegetation consisting of Japanese stilt grass (*Microstegium vimineum*), dark-green bulrush (*Scirpus atrovirens*), and lamp rush (*Juncus effusus*). The soil between 0 and 12 inches exhibits a low-chroma matrix (10YR 4/2) with a clay loam texture that contains redoximorphic features (7.5YR 4/4). ~~In accordance with 25 Pa. Code § 105.17(1),~~ Although Wetland WL-I1 is ~~classified as EV wetland resource~~ located in ~~due to its~~ proximity to a Public Water Supply (PWS), PADEP has advised that due to the distance between the wetland and the water intake, it appears that the wetland is not maintaining the quality and quantity of the downstream drinking water supply and should be classified as an "Other" wetland per 25 Pa. Code § 105.17(2). Streams S-I1 and S-I2 are associated water resources. The Wetland Function-Value Evaluation Form from the original application is provided in Appendix S2.A-3.

Stream S-I2 is identified as a perennial unnamed tributary (UNT) to Chester Creek, with bank to bank width of approximately 7 feet. The left bank height is 3 feet. The right bank height is 5 feet. The stream bed contains a boulder, cobble, gravel, and sand substrate.

Stream S-I1 is identified as an ephemeral stream with a bank to bank width of approximately 2 feet. The stream bed contains a silt and organic substrate. Stream S-I3 is identified as an ephemeral stream, with a bank to bank width of 2 feet. The stream bed contains a sand, silt, and organic substrate. Stream S-I4 or Chester Creek is a perennial stream with a bank to bank width of 70 feet. These streams' channels will not be crossed by the proposed modification, but their floodways are located in the requested LOD.

Based on review of eMapPA maintained by the PADEP and a review of Drainage List A of Pennsylvania Code, Title 25, Chapter 93, § 93.9h, the designated/protected uses and fisheries classification for Streams S-I2 and S-I4 are classified as Trout Stocked (TSF), Streams S-I1 and S-I3 are classified as drains to TSF, and all four streams are also classified as Migratory Fishes (MF) streams. PFBC designates Streams S-I1 and S-I2, and S-I3 as Drains to ATW and Stream S-I4 is classified as ATW. PFBC also classifies all four streams as Stocked Trout Streams (STS).

S2.C PNDI T&E plant and animal species or State T&E Species or Species of Special Concern Agency Coordination and Search Receipts

For this permit modification, a request was submitted to the Pennsylvania Natural Diversity Index on February 12, 2019 (PNDI-677014) regarding the potential of species of concern or unique habitat within the proposed modification corridor. Based on the results of this search, the PFBC identified the Eastern Redbelly Turtle (*Pseudemys rubriventris)*, a state-listed Threatened Species, and required further review of the proposed modification. SPLP provided the requested information to the PFBC regarding the proposed Glen Riddle/ 0620 HDD modification on February 13, 2019. A clearance letter was received from PFBC on March 6, 2019. Per PFBC's recommended avoidance measures, SPLP will maintain a barrier between the Project LOD and Chester Creek, and conduct pre-construction surveys for the Eastern Redbelly Turtle. Should any Eastern Redbelly turtles be found, SPLP will contact the PFBC within 48 hours and document the turtle found onsite and relocate the turtle to the nearest aquatic habitat. With implementation of these avoidance measures, potential impacts to the Eastern Redbelly Turtle are anticipated to be avoided. For further information, please refer to Module 2, S2.C of this Environmental Assessment and *Attachment G* of this permit modification request packet for the updated PNDI and agency coordination.

No other T&E plant and animal species, or State T&E Species, or Species of Special Concern were identified. However, as noted above, SPLP is aware of the timing window restriction associated with the designated trout streams (i.e., 3/1 through 6/15 for ATW) and will comply with timing window restrictions/limitations during construction and will work with the appropriate agencies to avoid and minimize potential impacts to trout/spawning/migrating fish. Again, SPLP will provide PADEP with future coordination/responses from PAFBC as they become available.

Please refer to *Attachment G* of this permit modification request packet for the updated PNDI request and agency submittal.

S2.D Resource Classification Information; Level 2 Rapid Condition Assessment Results, Resource Function, Riparian properties and any other relevant studies.

This permit modification requests the conversion of an approximate 0.66-mile (3,500 feet) HDD to a combination of direct pipe, conventional bore, and open cut installation methods for the 20-inch and portions of the 16-inch diameter pipelines. The new installation method will involve the open cut of Wetland WL-I1~~, an Exceptional Value (EV) wetland,~~ to install both pipes and an open cut to install the 20-inch pipe across Stream S-I2. Because the change in installation method would directly or indirectly impact aquatic resources, a brief description of the wetland, stream, and floodways (streams S-I1, S-I2, S-I3, and S-I4) are presented below.

Wetland WL-I1, the three UNTs to Chester Creek, and Chester Creek are located within the physiographic province of the Piedmont Upland section. The surrounding land uses are dominated by developed residential areas, including both single family residences and apartment buildings; open maintained grass and wooded areas; Riddlewood Drive; Glen Riddle Road; and SEPTA Railroad. There are some existing trees and shrubs in the riparian buffer, but they are limited due to the developed nature in the Project area.

A wetland function-value assessment of Wetland WL-I1 ~~(EV wetland)~~ was conducted and is included as Appendix S2.A-3. As presented therein, the principal functions and values identified for this wetland include groundwater recharge/discharge, floodflow alteration, and sediment/toxicant retention. The wetland is also suitable for nutrient removal, sediment/shoreline stabilization, and wildlife habitat. The wetland is not believed to be substantially utilized during the migration of wildlife or birds.

Streams S-I2 and S-I4 are identified as perennial streams. These streams provide potential habitat for seasonal spawning of game and non-game fish species. These streams also have the potential to be used for resting by a variety of birds and mammals. However, wildlife is likely to utilize more remote and secluded areas that offer more protection/cover for resting. As these streams are perennial, they support a continuous flow of water with moderate rates of flushing and residence times. Streams S-I1 and S-I3 are ephemeral streams and do not support a continuous flow of water. Streams S-I1 and S-I3 support similar habitat as Streams S-I2 and S-I4, except for providing a year-round water source.

Although all four streams are either classified as PAFBC ATW or Drains to ATW streams, seasonal migration of trout during spawning would likely be limited to stream Streams S-I2 and S-I4 based on their perennial flow characteristics. Similarly, even though all four streams are also designated TSF or drains to TSF, and MF streams, the potential for anadromous fish migration to occur is likely limited to Streams S-I2 and S-I4. Regardless, SPLP is aware of the timing window restriction associated with these streams (i.e., 3/1 to 6/15 for ATW) and will work with the appropriate agencies to avoid/minimize potential impacts to the streams' trout resources and comply with any agency restrictions or limitations. SPLP will provide PADEP with all future agency coordination/responses as they become available.

The streams also provide a food source for invertebrates, birds, reptiles, amphibians, and mammals. Growth of herbaceous plants constitute the food chain base that supports primary consumers such as invertebrates and small mammal herbivores. Secondary and tertiary consumers are supported by the diversity and abundance of prey in the wetland and stream

ecosystems. In addition, most of the streams support photosynthetic algae, overhanging woody vegetation, and/or small aquatic vascular plants that support invertebrate herbivores. Such invertebrates are consumed by small reptiles and fish that can inhabit the streams. Both the wetland and streams likely support aquatic insects or amphibians that meet specific prey requirements of birds and mammals with an affinity for stream habitats such as raccoon (*Procyon lotor*). The streams are also likely utilized by a variety of wildlife species as a source of drinking water.

The water quality of the streams is considered good, as evidenced by the TSF and trout classifications. The area is developed residential with a mix of single-family residential lots and apartment buildings with open and wooded areas surrounding most of the streams. The stream designations offer recreational and sport fishing opportunities; however, these opportunities may be limited due to property access issues (i.e., private property).

Module S3: Identification and Description of Potential Project Impacts

S3.A Impact Summary

Table S3.A-1 Summary of Project Impacts
Permit Modification Request for the Glen Riddle/0620 HDD Modification

Resource Category	Corps 404		PADEP/105	
	Temporary (acres)	Permanent (acres)	Temporary (acres)	Permanent (acres)
Wetland WL-I1, PEM	0.392	NA	0.191	0.201
Stream S-I2	0.01	NA	NA	0.01
Floodway (S-I1, S-I2, S-I3, SI4)	NA	NA	0.139	0.316*

* Floodway disturbance includes the stream impacts within the calculations, i.e. the floodway disturbance is the total proposed disturbance according to Chapter 105 regulations.

S3B. Standard Information Responses

The requested permit modification for the Glen Riddle/0620 HDD will not impact any resources identified in Module S2, Part A, except for Prime Farmland and potentially one public water supply, described below.

The proposed modification area is located near War Trophy Lane Park (0.07 mile to the east) and the Chester Creek Trail (0.09 mile to the west). War Trophy Lane Park includes baseball fields and a recreational swim club and pool. The Chester Creek Trail is a paved, multi-use trail used for walking, running and biking and managed/maintained by Delaware County. However, the proposed modification is not anticipated to result in direct or long-term impacts to the purpose/functions of these recreational areas as there would be no change in existing land use.

Prime Farmland

The proposed Glen Riddle/0620 HDD permit modification would cross a small amount of designated prime farmland soils. Specifically, this modification would cross approximately 0.18 acre of prime farmland soils. However, while the area contains prime farmland soils, no agricultural activities occur in the area. Potential short-term impacts to prime farmland soils associated with construction of the Project may include increased soil erosion and sedimentation associated with runoff; compaction of soils caused by construction vehicles and equipment; and, poor revegetation. However, SPLP will prevent and minimize impacts on prime farmland soils by utilizing the required BMPs to avoid and minimize sedimentation and erosion or runoff, and soil compaction where needed. Specifically, SPLP will employ, as needed general, stabilization and structural controls to divert stormwater flows, convey runoff, prevent sediments from moving off-site, and reduce the erosive forces of runoff waters. Compost filter socks and other structural controls will be utilized during construction activities. The proposed modification would not have long-term impacts on Prime Farmland soils.

Public Water Supply

As previously noted, there is one PWS identified within 0.5 mile of the proposed modification. SPLP sent a letter notification requesting additional information to the Aqua PA on September 20,

2016 as part of the Project's Chapter 105 Joint Permit Application for Delaware County. The proposed open cut installation method will have minimal to negligible impact on groundwater resources as well as surface water quality and is not expected to impact this PWS. Nonetheless, SPLP notified Aqua PA on March 18, 2019 of the proposed permit modification, including revised site plans, which is provided in Appendix S2.A-4.

S3.C Subfacility Details

Information related to the proposed water obstruction, encroachment activities, and temporary/permanent impacts associated with the requested permit modification to open cut wetland and stream resources was provided in the original PPP Chapter 105 Joint Permit Application (E23-524. APS 879056) and is summarized within this Environmental Assessment, as well as the other attachments comprising this permit modification packet.

S3.D Direct and Indirect Impacts

As discussed above, direct and indirect impacts for the overall Project were presented in Attachment 11, Enclosure E (Part 2) of the original PPP Chapter 105 Joint Permit Application (E23-524. APS 879056). Excerpts from the submittal relevant to the Glen Riddle / 0620 HDD modification are presented below.

Wetland

The open cut crossing (open trench) of Wetland WL-I1 will result in approximately 0.20 acre of permanent and 0.19 acre of temporary impacts. As defined by PADEP, permanent impacts include direct and indirect impacts resulting from the placement or construction of the pipeline and impacts to those areas necessary for the operation and maintenance of the pipeline. Temporary impacts include areas affected during the construction of the Project that will be restored when construction is completed. All physical/ecological impacts are considered minor and temporary: topsoil and subsoils will be segregated, trench plugs will be installed at wetland boundaries to maintain wetland hydrology, and the wetland will be restored to its original condition (i.e., wetland soils, hydrophytic vegetation, elevation, hydrologic conditions, etc.). SPLP will not maintain the ROW through wetland areas (i.e., no mowing); therefore, the pre-and post-construction conditions of the wetland will remain the same. In addition, the Project would not involve any permanent fill or conversion of cover type/vegetation, and there would be no permanent loss of wetlands or streams associated with this permit modification.

~~As previously noted, Wetland WL-I1 is classified as EV as it is located near an identified PWS.~~ The ATWS and open cut/trench construction LOD in WL-I1 would be a temporary disturbance to the wetlands' vegetation, hydrology, soils, and functions and values. In order to reduce impacts, SPLP will separate topsoil during construction and replace the wetland soils to their original horizon and elevations to maintain the natural seed bed and facilitate revegetation of the disturbed wetland area; use timber mats to reduce soil compaction; and, minimize the duration of construction to the extent possible. In addition a Professional Geologist will advise on 1) maintaining the hydrology of adjacent areas through installation of drains/flumes and/or pumps if seeps essential to adjacent area hydrology are encountered, 2) the presence of groundwater confining layers (e.g., rock, clay, fragipan) and the presence of groundwater seeps and drains, and 3) 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. Any

confining layer encountered will be restored to the original condition to the maximum extent under guidance of the Professional Geologist. At wetlands determined to require confining layer restoration, the Professional Geologist will be on-site during wetland backfilling to ensure proper soil layer restoration and will advise on bentonite sandbag layering along the entire or portions of the trench line at the appropriate height. Based on implementation of these BMPs, effects of the requested modification are likely to be minimal. As previously noted, SPLP will restore the disturbed wetland area to its pre-existing condition such that surface water hydrology is restored and the re-establishment of hydrophytic vegetation is facilitated. SPLP will also implement the appropriate E&S BMPs ~~and the appropriate ABACT measures~~ for this ~~EV~~ wetland. Consequently, the functions and values of Wetland WL-I1 will incur nominal impacts and ~~its classification as EV~~ will not be altered. Similarly, temporary and minor impacts would occur to the food chain, nesting/resting, and feeding activities within the wetland. Additional detail regarding wetland construction methods were provided in the Project's Chapter 105 Joint Permit Application in Attachment 11 Enclosure E Part 2.

Streams

The open cut crossing of Stream S-I2 will result in approximately 0.01 acre of permanent and no temporary impacts, since the entire construction right-of-way will be maintained for operation. Construction activities within the floodways of Streams S-I1, S-I2, S-I3, and S-I4 will result in approximately 0.32 acre of permanent and 0.14 acre of temporary floodway impacts. As defined by PADEP, permanent impacts include direct and indirect impacts resulting from the placement or construction of the pipeline and impacts to those areas necessary for the operation and maintenance of the pipeline. Temporary impacts include areas affected during the construction of the Project that will be restored when construction is completed, and the total floodway impacts include the total stream impacts. All physical/ecological impacts are considered minor and temporary as the streams would be restored to their original condition (i.e., elevation, flow, stream substrate, hydrologic conditions, etc.) immediately following construction. In addition, the Project would not involve any permanent fill and there would be no permanent loss of streams associated with the Project.

Impacts to Stream S-I2 would occur as a result of in-stream construction activities and would result in a temporary localized increase in turbidity levels and downstream sediment deposition. Sediments that become suspended during the short period of in-stream disturbance (i.e., installation of the dam and pump) are expected to settle out of the water column relatively quickly.

Temporary impacts would occur to aquatic life in the streams at or downstream from the construction site (pipe crossing), including potential degradation of benthic habitat due to direct disturbance to the bottom substrate in the trench zone, and associated disturbances to aquatic vegetation and invertebrates with the construction ROW. Indirect impacts from sedimentation may affect areas downstream, but generally conditions would be expected to resolve relatively quickly (e.g., dry crossing methods involving in-stream excavation would have a limited effect on downstream sedimentation for a period of 1 to 3 days).

Indirect, long-term impacts to fish spawning/migration could occur if substantial changes to Stream S-I2 (as it is a perennial stream) substrate or current patterns result from Project construction. However substantial changes to stream substrate and current patterns are not anticipated because the native stream substrate will be replaced, and stream bed and banks will

be restored as closely as possible to the original contours following construction. Furthermore, SPLP is aware of the timing window restriction associated with trout streams (i.e., 3/1 to 6/15 for ATW) and will work with the appropriate agencies to avoid/minimize potential impacts to trout resources and comply with any agency restrictions or limitations. No impacts to fish spawning/migration are anticipated during Project operations.

Impacts to riparian areas have been minimized to the maximum extent practicable by locating the stream crossing and ATWSs in areas previously disturbed by construction and restoration of IRs in the area. In addition, riparian buffers and stream banks disturbed by the Project will be revegetated (seeded/planted) following construction as soon as practicable to facilitate vegetative growth along the stream channel in accordance with the included E&S Plan (*Attachment D* of this permit modification packet). For more information please refer to Attachment 11, Enclosure E (Part 4) Impact Avoidance, Minimization and Mitigation Procedures of PPP's Chapter 105 Joint Permit Application.

In addition to the above, Project construction will result in no fill, aboveground facilities or alteration of surface elevations/contours are proposed within the streams' floodways as they will be restored to pre-construction conditions. As such, the modification would not result in long-term impacts to the associated floodways.

Construction of the proposed Project is not expected to affect the flushing characteristics of the streams. In addition, the Project will not alter the volume of water or flow rates that the streams typically/naturally experience. Furthermore, the stream channel will be restored to pre-construction contours, thereby restoring pre-existing flushing characteristics and patterns within the stream crossed. Similarly, operation of the Project would not have any impact on natural drainage patterns.

Construction of the proposed modification is not expected to affect groundwater discharge that may be important for supporting stream baseflow or hydrology. Trench plugs will be installed in the trench at the entry and exit of all streams crossed to prevent draining of streams along the trench line. In addition, there are no groundwater control features or interceptor structures incorporated into the Project design. Topographic contours and drainage patterns will be restored following construction of the Project and impacts to groundwater discharge are not anticipated.

As there are no proposed aboveground facilities associated with this permit modification request, construction will not negatively impact the ability of the wetland and streams to either store or control storm and flood waters.

SPLP has designed the Project to avoid and minimize impacts to stream resources to the greatest extent possible. SPLP will conduct all activities in accordance with the Chapter 102 Permit requirements and will implement erosion and sediment control BMPs and ABACT measures, as necessary. Thus, this requested permit modification will not cause long-term degradation of water quality, alter flow volumes, or change the direction of flow.

S3.E Antidegradation Analysis

An Antidegradation Analysis was prepared for the overall Project and submitted as part of the PPP Chapter 105 Joint Permit Application (E23-524. APS 879056) in Attachment 11, Enclosure E (Part 5). The Antidegradation Analysis was prepared in accordance with 25 Pa. Code §

105.14(b)(11). Specifically, SPLP's Joint Permit Application for a Pennsylvania Water Obstruction and Encroachment Permit Application for the Project needed to ensure consistency with State antidegradation requirements contained in Chapters 93, 95 and 102 (relating to water quality standards; wastewater treatment requirements; and erosion and sediment control) and the Clean Water Act (CWA) (33 U.S.C.A. § § 1251—1376).

PADEP has implemented an Antidegradation Program to promote the maintenance and protection of existing water quality for High Quality (HQ) and Exceptional Value (EV) waters, and the protection of existing uses for all surface waters (PADEP 2003). Wetland WL-I1 is not classified as an EV water and UNTs to Chester Creek (Streams S-I2, S-I1, S-I3) and Chester Creek (Stream S-I4) are not classified as HQ but are ~~as~~ Trout Stocked (TSF), or drains to TSF, MF streams, and ATW or drains to ATW. Therefore, the antidegradation requirements applicable to this permit modification include protection of existing instream water uses (93.4a(b)) ~~and the level of water quality (93.4a(d)) of EV waters~~.

- **Section 93.4a(b)** states that "Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." In order to reduce water use impacts, SPLP has limited the land disturbance to the excavated trench line, and temporary minor grading of the stream banks at the travel lane crossing, as required; limited the time/duration of in-stream construction (typically less than 2 days); designed the crossings such that the pipeline will be 5 feet under the streams, as compared to the PADEP 3 foot depth requirement; and, implemented erosion and sediment control measures for all land disturbances in accordance with PADEP's Erosion and Sediment Pollution Control Program Manual (PADEP 2012) as demonstrated throughout the Project's ESCGP Permit applications. With the proper implementation and maintenance of these protective measures, construction-related Project impacts to water quality such as increased turbidity related to sedimentation and in-stream construction will be minor, temporary, and localized and will not adversely impact or degrade the water resources. Specifically, the water quality and designated/existing uses of Stream S-I2, and the floodways of Streams S-I1, S-I2, S-I3 and S-I4 will be maintained and protected post-construction.

- ~~**93.4a(d): Protection for Exceptional Value Waters** states that "The water quality of Exceptional Value Waters shall be maintained and protected." The proposed Project will protect and maintain the existing/designated uses and water quality of the EV wetland impacted by this requested permit modification. Specifically, SPLP will install both pipes at the same time to minimize the duration of construction through Wetland WL-I1 while maintaining safety standards for working over "hot lines", and SPLP limit construction activities to the PEM portion of Wetland WL-I1 such that there are no impacts to the PFO portion of this EV wetland. A large portion of the requested LOD is currently disturbed as part of the ME1 valve station upgrades as well as the approved restoration efforts associated with the previous IRs in this area. SPLP will limit the land disturbance to the excavated trench line and minor grading of the travel lane crossing, as required; roots/stumps will be left in place, to the extent possible, so that the roots stabilize the soils (minimize erosion), and re-establishment of native vegetation is facilitated; require the use of timber mats when working in and travelling through the wetland; design the crossing such that the 20-inch and 16-inch pipe will be 4 feet under wetlands, as compared to the~~

~~PADEP 3 foot depth requirement; and, implement erosion and sediment control measures for all land disturbances in accordance with PADEP's Erosion and Sediment Pollution Control Program Manual (PADEP 2012) as demonstrated throughout the Project's ESCGP Permit applications.~~

~~In addition, SPLP has incorporated ABACT BMPs into their E&S Plan to further reduce potential erosion and sediment impacts to the EV wetland crossing. Specifically, standard and ABACT BMPs that SPLP will implement to control/manage erosion and sedimentation within the Project area include:~~

- ~~Use of wash racks at rock construction entrances;~~
- ~~Placement of compost filter socks on the downgradient side of the filter bags and/or dewatering structure;~~
- ~~Application of erosion control blanket within 100 feet of receiving waters and on slopes 3:1 (H:V) or steeper;~~
- ~~Installation of compost filter socks at slope breaker outlets to provide additional filtration prior to discharge to surface waters;~~
- ~~Installation of berms and trenches to promote infiltration and manage flow rate;~~
- ~~Implementation of the PPC Plan; and,~~
- ~~Application of permanent seeding for site restoration.~~

~~As previously stated, Project impacts to streams and EV wetland resources, will be minor, temporary, and localized. As further demonstrated above,~~ Project implementation of the requested crossing method, ~~PADEP-approved ABACT~~ BMPs identified above, and the revised 102 drawings (*Attachment D* of this permit modification request packet) will ensure the maintenance and protection of the overall water quality of the streams by reducing/controlling turbidity associated with sedimentation and in-stream construction activities.

Chapter 93.4c(a)(2) requires the protection of endangered or threatened species if PADEP has confirmed the presence, critical habitat, or critical dependence of endangered or threatened Federal or Pennsylvania species in or on a surface water. Accordingly, SPLP has coordinated and will continue to coordinate with federal and state agencies to identify and ensure protection of any endangered and threatened species and/or their critical habitat, or dependence on the surface waters crossed by this requested permit modification. Please refer to Module 2, S2.C of this Environmental Assessment and *Attachment G* of this permit modification request packet for additional information related to the protection of endangered/threatened species associated with the requested modification (i.e., Eastern Redbelly Turtle).

Chapter 93.6 states that a project will not introduce/discharge any substance "in concentrations or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant, or aquatic life," including actions that could produce turbidity. As demonstrated throughout this permit modification and the original permit application, the requested permit modification will result in minor, temporary, and localized impacts to surface waters of the

Commonwealth. Specifically, the requested permit modification does not involve any permanent structures/facilities that will discharge any treated or created industrial wastewater, nor will it alter the existing natural conditions (chemical, biological, or physical) of the water resources crossed by the Project. In addition, the Project does not involve the addition or discharge of any toxic (Section 93.8a) or harmful substances into the waters of the Commonwealth. All water resources will be restored to their pre-existing conditions following Project construction such that their designated/existing water uses are not impacted by the Project. Accordingly, the proposed Project does not have the potential to alter the water quality such that the existing water uses or aquatic life of the ~~EV~~ aquatic resources will be affected.

Please refer to the complete *Antidegradation Analysis* for additional details/information.

S3.F Alternatives Analysis

An Alternatives Analysis (AA) was prepared and submitted as part of the PPP Chapter 105 Joint Permit Application (E23-524) in Attachment 11, Enclosure E (Part 3). For this permit modification request, an Alternatives Analysis specific to the Glen Riddle/0620 HDD Modification has been prepared and is presented in Attachment A of this modification request application. This AA fully assesses the use of boring methods (other than HDD) under stream S-I1 and wetland WL-I1 and demonstrates why these methods are neither technically feasible nor practicable taking into consideration existing technology, logistics, and safety; fully assesses other impact avoidance and minimization measures; and demonstrates impacts to wetland WL-I1 are in compliance will all applicable conditions in 25 Pa. Code § 105.18(b)(1) through (7).

The crossing of stream resources is unavoidable due to the linear nature of the proposed PPP Project, and as described in the Environmental Assessment, S1.B – Water Dependency (refer to *Attachment C* of this permit modification). Therefore, to avoid direct impacts to these resources, SPLP originally planned to HDD under both the wetland and stream. However, there were complications encountered during the 16-inch pipeline HDD and drilling fluid discharges resulted in IRs into the Waters of the Commonwealth.

SPLP evaluated other routes around the area but are limited due to the density of roads and residential properties surrounding the proposed route. In addition, a route to the west or east would likely impact more forested areas, possibly wetlands, and require a “greenfield”, or new, right-of-way through these areas resulting in more permanent forested impacts. Similarly, a conventional auger bore was evaluated for the wetland and stream areas, but it was determined not to be feasible due to the underlying geology and concerns regarding groundwater management.

Because of the IRs that occurred during the initial HDD attempt, SPLP has elected to use a combination of alternate methods of installation. Alternative routes were evaluated but were not considered favorable as they would likely result in more permanent impacts to environmental resources, as well as human environment resources (i.e., residential and developed areas). In addition, alternative construction methods were considered but were determined to be neither technically feasible nor practicable. Therefore, the professional opinion of the HDD Reevaluation Team, consisting of the Geotechnical Evaluation Leader, Professional Geologists, Professional Engineers, and other construction specialists is that the use of an open cut construction method with a dam and pump bypass in place for the stream crossing will have the least impact to

environment resources, as the wetland area and stream flow will be managed in accordance with all permit conditions (dam and pump) and can completed in the most efficient and timely manner, including restoration/stabilization of all resources and previous IRs. Moreover, use of the open cut construction method is the only technically feasible, and therefore the only practicable, alternative within the existing permitted right-of-way taking into consideration existing technology and logistics, including safety.

S3.G Potential Secondary Impact Evaluation

A Resource ID and Project Impacts Report was prepared and submitted as part of the PPP Chapter 105 Joint Permit Application (E23-524) in Attachment 11, Enclosure E (Part 2). Potential secondary impacts to wetland/streams and the aquatic habitat, water quantity, and water quality resulting from the Project were discussed in Section 4.1 of the report. Excerpts applicable to the proposed permit modification affected wetland and streams and additional pertinent information are discussed below.

Potential secondary impacts to wetland/stream habitats could result from the modification including short-term release of sediments into waterways and vegetation clearing, that could result in the temporary displacement of wildlife to adjacent areas. These short-term impacts adjacent to and downgradient of the LOD could temporarily alter substrate and make it less suitable for spawning and foraging, and may create temporary turbidity that could alter the feeding habits of local wildlife. In addition, the clearing of vegetation reduces the shelter and buffer capacity to adjacent habitats and creates new edge habitat when located through greenfield areas. SPLP has mitigated for these potential secondary impacts by minimizing/reducing the area of disturbance and clearing, and minimizing the duration of construction activities in stream and wetland areas, implementing the E&S BMPs (Attachment D) and appropriate ABACT measures, and restoring the disturbed areas with vegetation to avoid impacts off the ROW.

Other potential secondary impacts to wetlands such as the introduction of invasive or exotic vegetation will be avoided by topsoil segregation of trench material, which maintains the native seed source, and the prompt establishment of native or temporary cover immediately following construction. In addition, restoration of wetland areas by planting native shrub vegetation will avoid secondary impacts to adjacent habitat caused by changes in vegetative community or establishment of invasive or exotic vegetation.

Potential secondary impacts on adjacent stream/aquatic habitat functions could result from the short-term release of turbid waters and vegetation clearing, resulting in the temporary displacement of wildlife that use adjacent areas for spawning, foraging, nesting, rearing, and resting. However, the potential secondary impacts from the release of turbid waters, at most, will be negligible in nature given the short duration of in-stream construction, the intermittent flow characteristics of the streams, and through implementation of temporary and permanent E&S controls (refer to Attachment D of this permit modification packet). As noted above, the streams have some riparian areas which would be revegetated. Restoration of these areas with native plant species will minimize potential secondary impacts to adjacent habitat from the establishment of invasive or exotic vegetation.

Potential secondary impacts on water quantity or the hydrology of streams could result from changes in natural/current drainage patterns and alteration in flow and water levels from

construction. However, the modification does not involve any stream relocations, enclosures, channel deepening/dredging activities, and addition of structures or impervious surfaces in the wetland/stream complex. Given that the modification does not involve direct impacts to natural and current drainage patterns, the modification will likewise not result in secondary impacts to natural and current drainage patterns. Temporary dam and flow bypass methods will be used to maintain a continuous downstream flow during construction.

Potential secondary impacts to stream water quality beyond the Project's limit of disturbance could result from: release of sediments/turbid waters from trenching, dewatering, clearing and grading of adjacent land and stream banks, and post-construction stream bank subsidence; and, release of pollutants from construction equipment or activities adjacent to waters. However, in accordance with the Chapter 102 E&S requirements, trench dewatering will be monitored and directed into appropriate receiving structures located in well-vegetated uplands to allow for filtration. Released water will naturally infiltrate to prevent secondary impacts to water quality of streams outside the ROW. Potential secondary impacts from stream bank subsidence will be avoided by leaving roots/stumps in place, except for over the trench, and by stabilizing/revegetating stream banks as soon as possible after construction. Post-construction monitoring will ensure that successful restoration occurs, or necessary corrective actions are implemented to result in successful restoration, thereby avoiding potential secondary impacts from stream bank subsidence/subsequent downstream erosion and sedimentation. Additionally, aerial and ground inspections during Project operation will identify stream bank subsidence and soil erosion issues which will be rectified by repairs or installation of temporary erosion control devices until permanent erosion control measures become effective.

Potential secondary impacts to adjacent resources will be avoided and minimized to the extent possible such that there is no loss of aquatic habitat, water quantity, or water quality.

S3.H Potential Cumulative Impacts

A Cumulative Impact Analysis (CIA) was prepared for the overall Project and submitted as part of the PPP Chapter 105 Joint Permit Application (E23-524) in Attachment 11, Enclosure E (Part 6). The CIA addresses the cumulative impact for the entire Project and other potential or existing SPLP and other oil and gas projects within the Cumulative Impact Assessment Area (CIAA) of the Project.

The wetland affected by construction for the proposed Glen Riddle/0620 HDD modification will be restored as a wetland. Some functions and values of the wetland would be temporarily affected during construction. However, as this wetland extends beyond the Project boundaries, the wetland would also continue to provide functions and values during construction as the impact area relative to the size of the wetlands is minor. Furthermore, the PEM wetland affected by the modification will be replanted onsite to mitigate temporal impacts to functions and values. Some functions/values may be slightly reduced (wildlife habitat), some will not be altered (groundwater discharge), and others may be increased due to the establishment of a thick herbaceous ground layer (sediment retention and nutrient removal). There will be a temporal loss of the previously listed functions during construction and near-term post construction until the wetland is restored. No permanent fill in wetland is proposed; consequently, no loss of wetland area would result from construction or operation of the requested modification in crossing method. When the impacts to the wetlands from the proposed modification are added to the wetland impacts from all other

projects in the CIAA, a maximum of approximately 47.82 acres of wetlands would be disturbed. However, with implementation of BMPs for each potential or existing project and compliance with permit conditions, disturbances to wetlands are (existing projects) or are anticipated to be (potential projects) minor and temporary and would result in no more than minimal individual and cumulative adverse environmental effects.

The cumulative impacts to streams (including floodways) associated with proposed modification would be limited to the aggregate impacts of the Project (and other potential or existing SPLP projects, and other evaluated projects within the CIAA) on waterbodies. As reported in the CIA, implementation of the Project, including the addition of impacts associated with the requested modification, and other potential or existing SPLP projects, and other projects evaluated within the CIAA will result in a cumulative waterbody disturbance of approximately 64,960 linear feet. These disturbances will result in no loss of waters or long-term water-quality and quantity. As documented in the CIA, with the implementation of each potential or existing project in compliance with BMPs and permit conditions, all the disturbances to streams are (existing projects) or are anticipated to be (potential projects) minor and temporary; therefore, no more than minimal and temporary individual and cumulative adverse environmental effects are anticipated.

Module S4: Mitigation Plan

S4.A Avoidance, Minimization and Unavoidable Impacts

The crossing of Wetland WL-I1, Stream S-I2, (including floodway) and the floodways of Streams S-I1, S-I3, and S-I4 is unavoidable due to the linear nature of the proposed PPP Project and as described above in S1.B – Water Dependency. SPLP originally proposed an HDD installation of both the 20-inch and 16-inch pipe to avoid direct impacts to these resources. However, as described in the Project Description (Attachment A of this permit modification request) during the pilot hole drilling phase on the permitted 0620 HDD for the 16-inch pipeline installation through this area, there were several inadvertent returns (IRs) in which drilling mud/fluid entered Waters of the Commonwealth. In order to contain and clean-up these IRs, SPLP installed sand bag containments, flumes, and pump arounds. In addition, groundwater was encountered at the eastern end of the HDD, near Stream S-I2 resulting in dewatering issues and safety concerns in the pits. Therefore, given SPLP's experience during the 16-inch HDD at this location, SPLP has elected to abandon any future HDD attempts to install the pipelines through this area and has identified an alternate installation method that minimizes impacts to Waters of the Commonwealth.

SPLP evaluated other routes around the area but are limited due to the density of roads and residential properties surrounding the proposed route. In addition, a route to the west or east would likely impact more forested areas, possibly wetlands, and require a "greenfield", or new, right-of-way through these areas resulting in more permanent forested impacts. Similarly, a conventional auger bore was evaluated for the wetland and stream areas, but it was determined not to be feasible due to the underlying geology and concerns regarding groundwater management. SPLP evaluated an open cut of the existing permitted right-of-way and determined this would have the least impact and allow the most effective means for installing the pipelines and restoring the previous IR areas.

Given the existing conditions at the Glen Riddle/ 0620 HDD modification location and numerous IRs that occurred during the 16-inch HDD, the HDD evaluation staff has elected to install the 20-inch and portions of the 16-inch pipeline through this area using an alternate method of installation. Alternative routes were evaluated but were not considered favorable as they would likely result in more permanent impacts to environmental resources, as well as human environment resources (i.e., residential and developed areas). In addition, alternative construction methods were considered but were determined to be neither technically feasible nor practicable. Therefore, the professional opinion of the HDD Reevaluation Team, consisting of the Geotechnical Evaluation Leader, Professional Geologists, Professional Engineers, and other construction specialists is that the use of an open cut construction method with a dam and pump bypass in place for the stream crossing will have the least impact to environment resources, as the wetland area and stream flow will be managed in accordance with all permit conditions (dam and pump) and can completed in the most efficient and timely manner, including restoration/stabilization of all resources and previous IRs. Moreover, use of the open cut construction method is the only technically feasible, and therefore the only practicable, alternative within the existing permitted right-of-way taking into consideration existing technology and logistics, including safety.

As demonstrated within SPLP's Chapter 105 Joint Permit Application (JPA), SPLP has avoided and minimized potential impacts to waters from the Project. In so doing, there is no practicable alternative to each of the crossings that would have less effect on each waterbody, and not have other significant adverse effects on the environment, taking into consideration construction costs, existing technology, safety, and logistics. Those remaining unavoidable impacts are outlined within the resource impact tables located within the Impact Avoidance, Minimization, and Mitigation Procedures provided in Attachment 11, Enclosure E, Part 4 of the PPP Chapter 105 Joint Permit Application (E23-524) and *Attachment E* of this permit modification request.

S4.B Repair, Rehab, and Restoration Actions/Proposed Preservation and Maintenance Operations

SPLP will construct the requested permit modification in accordance with the Chapter 102 Permit requirements and will implement erosion and sediment control BMPs as required and presented throughout this permit modification request, during all construction and restoration activities. Please refer to *Attachment D* of this permit modification request packet for the updated E&S and Restoration plans specific to the requested open cut (open-trench) dry crossing of Wetland WL-I1 and Stream S-I2 (including floodway), and the floodways of Streams S-I1, S-I3 and S-I4.

In addition, SPLP will implement all protective and/or preventative requirements required by the agencies with regard to wild trout resources and species of concern. Please refer to *Attachment G* of this permit modification request packet for the PNDI Update and Agency Coordination specific to the modification.

S4.C Compensatory Mitigation

This permit modification request for a construction methodology change to an open cut (open trench) dry crossing at the proposed modification would result in minor, short-term, and temporary resource impacts. No permanent fill of wetland or stream and/or relocation of these resources would occur. The wetland and stream would be restored to their original conditions and there will be no loss of resource function; therefore, compensatory mitigation is not required or offered.

S4.D Project Monitoring Plan

Utility Inspection Program & Environmental Compliance Program

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

Supplemental to their Utility Inspection Program, SPLP has implemented 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 conditions. The primary elements of the ECP are environmental training; environmental inspection; biological and cultural resource monitoring/training; and, agency and Project team notification and documentation requirements. Each of these elements is incorporated into the single integrated ECP organization structure and execution plan.

Post-Construction Monitoring

Wetland WL-I1, Stream S-I2 (including floodway), and the floodways of Streams S-I1, S-I3, and S-I4 will be temporarily impacted and restored to original grade, stabilized, and vegetated in accordance with the E&S Plan (refer to *Attachment D* of this permit modification request packet).

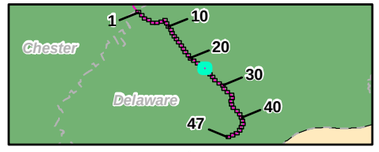
Post-construction, the wetland and streams will be monitored in accordance with the Project's Impact Avoidance, Minimization, and Mitigation Procedures provided in Attachment 11, Section E, Part 4 of the PPP Chapter 105 Joint Permit Application (E23-524. APS 879056) as well as all applicable permits and clearances, including any specific requirements/reporting associated with sensitive species (i.e., Eastern Redbelly Turtle). Hydrology will be evaluated during each inspection to ensure that the hydrologic regimes are similar to the preconstruction 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. Hydrology will also be monitored by observing soil morphology within stationary plots located in the temporarily impacted wetland. In addition, SPLP has developed a site-specific plan for WL-I1 (Restoration and Monitoring Plan – Wetland I1, September 2018) that expands the monitoring area to include all areas impacted by pipeline construction activities (i.e., the IRs and subsidence area and subsurface flowable fill). If restoration efforts fail to eliminate permanent impacts to Wetland I1 or any other aquatic resources, then a modified restoration plan (corrective action plan) will be submitted to the DEP for review and approval.

ATTACHMENT E

Updated Site Plan
Aquatic Resource Impact Table
Revised June 2020

Legend

- Sheet Boundary
- PPP 1
- PPP 2
- PPP 1, Bore
- PPP 1, HDD
- PPP 1, Direct Pipe
- PPP 2, Bore
- PPP 2, HDD
- PPP 2, Direct Pipe
- Pullback String
- Permanent Easement (no surface disturbance)
- Permanent ROW
- Temporary ROW
- ATWS
- Permanent Access Road
- Temporary Access Road
- ROW-Travel LOD
- ROW-Travel and Clearing LOD
- Existing Block Valve
- New Block Valve
- Block Valve Setting LOD
- Station LOD
- Bore Pits
- PEM Wetland
- PFO Wetland
- PSS Wetland
- Pond
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Chapter 105 Floodway
- Waived Floodway
- Ch. 106 Floodplain Fringe



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0 25 50 100 150 200

1 inch = 100 feet

Site Plan for the Sunoco Pennsylvania Pipeline Project, Delaware County, PA.
Sheet 24 of 47

Prepared By: TETRA TECH

Date: 06/2020

Base Map; SPLP 2014-2016, Roads from NRCS Geo-spatial Data Giveaway, 100-Year Floodplain from FEMA NFHL, downloaded 9/2016. Aquatics, TT 2013-2016.

Coordinate System: NAD 83 Stateplane, PA South, Feet

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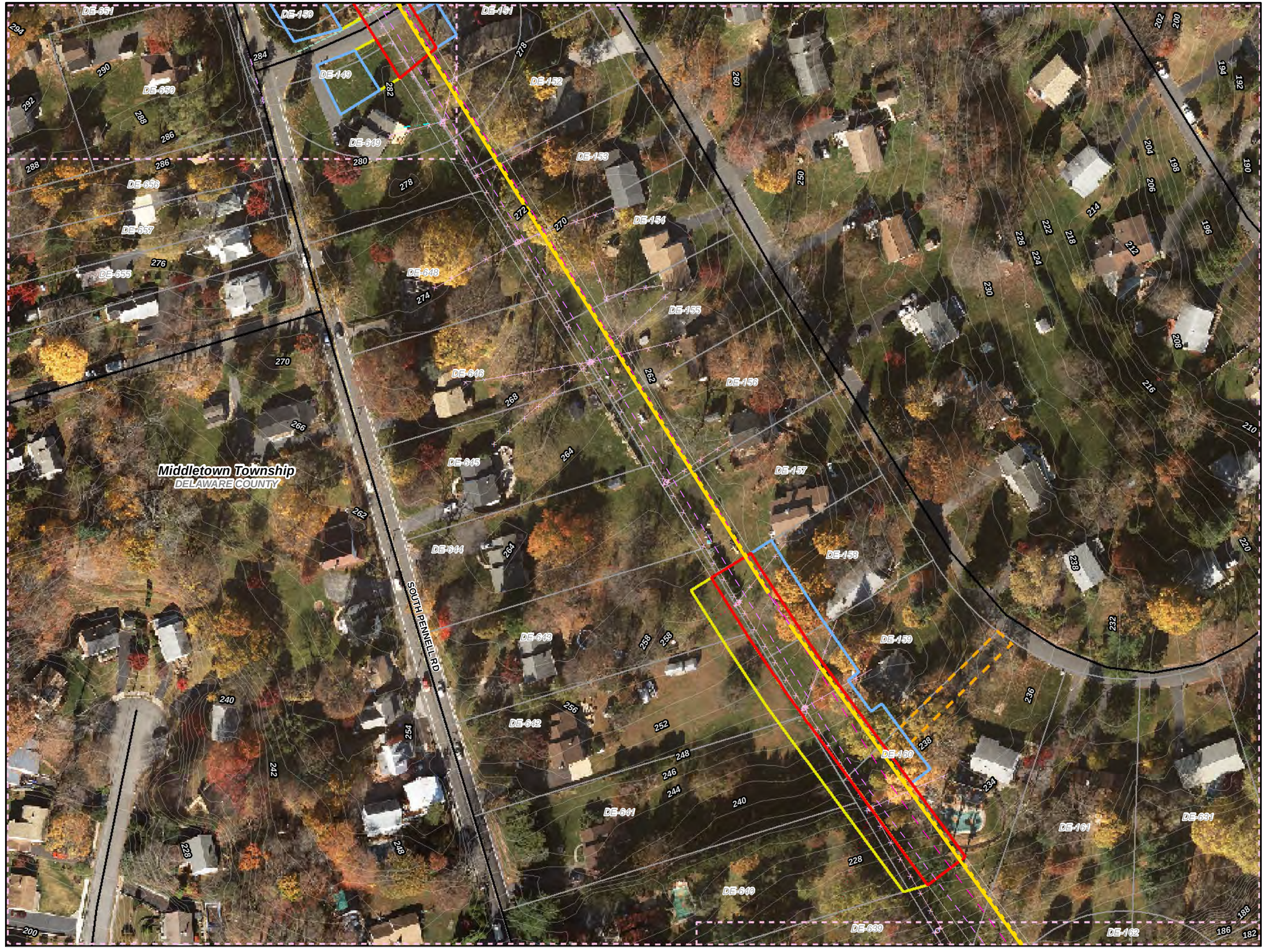
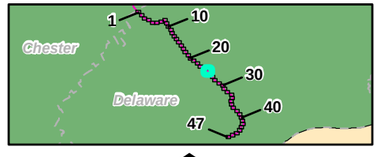


Legend

- Sheet Boundary
- PPP 1
- PPP 2
- PPP 1, Bore
- PPP 1, HDD
- PPP 1, Direct Pipe
- PPP 2, Bore
- PPP 2, HDD
- PPP 2, Direct Pipe
- Pullback String
- Permanent Easement (no surface disturbance)
- Permanent ROW
- Temporary ROW
- ATWS
- Permanent Access Road
- Temporary Access Road
- ROW-Travel LOD
- ROW-Travel and Clearing LOD
- Existing Block Valve
- New Block Valve
- Block Valve Setting LOD
- Station LOD
- Bore Pits
- PEM Wetland
- PFO Wetland
- PSS Wetland
- Pond
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Chapter 105 Floodway
- Waived Floodway
- Ch. 106 Floodplain Fringe



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0 25 50 100 150 200

1 inch = 100 feet

Site Plan for the Sunoco Pennsylvania Pipeline Project, Delaware County, PA.
Sheet 25 of 47

Prepared By: TETRA TECH

Date: 06/2020

Base Map; SPLP 2014-2016, Roads from NRCS Geo-spatial Data Giveaway, 100-Year Floodplain from FEMA NFHL, downloaded 9/2016. Aquatics, TT 2013-2016.

Coordinate System: NAD 83 Stateplane, PA South, Feet

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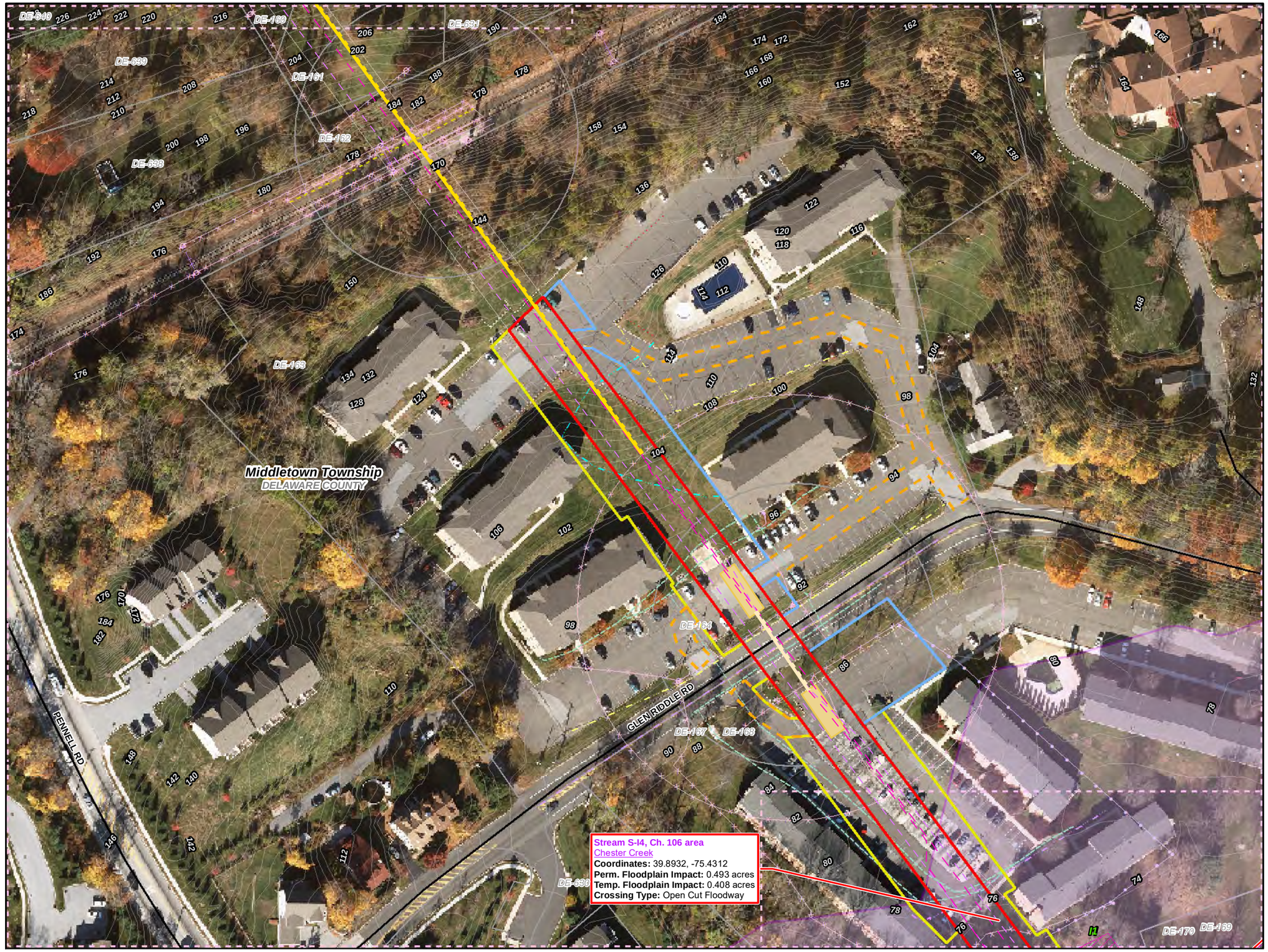
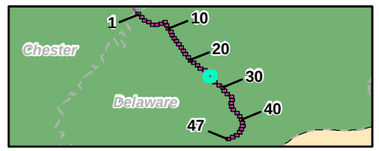


Legend

- Sheet Boundary
- PPP 1
- PPP 2
- PPP 1, Bore
- PPP 1, HDD
- PPP 1, Direct Pipe
- PPP 2, Bore
- PPP 2, HDD
- PPP 2, Direct Pipe
- Pullback String
- Permanent Easement (no surface disturbance)
- Permanent ROW
- Temporary ROW
- ATWS
- Permanent Access Road
- Temporary Access Road
- ROW-Travel LOD
- ROW-Travel and Clearing LOD
- Existing Block Valve
- New Block Valve
- Block Valve Setting LOD
- Station LOD
- Bore Pits
- PEM Wetland
- PFO Wetland
- PSS Wetland
- Pond
- Ephemeral Stream
- Intermittent Stream
- Perennial Stream
- Chapter 105 Floodway
- Waived Floodway
- Ch. 106 Floodplain Fringe



N

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1 inch = 100 feet

Site Plan for the Sunoco Pennsylvania Pipeline Project, Delaware County, PA.
Sheet 26 of 47

Prepared By: TETRA TECH

Date: 06/2020

Base Map; SPLP 2014-2016, Roads from NRCS Geo-spatial Data Giveaway, 100-Year Floodplain from FEMA NFHL, downloaded 9/2016. Aquatics, TT 2013-2016.

Coordinate System: NAD 83 Stateplane, PA South, Feet

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Wetland I1, PEM,
HUC12: 020402020605
Coordinates: 39.8945, -75.4320
Perm. Impact: 0.201 acres
Temp. Impact: 0.191 acres
Crossing Type: Open Cut
E&S Sheet: ES-6.20 **Permit:** Individual

Wetland I1, PEM, EV
HUC12: 020402020605
Coordinates: 39.8945, -75.4320
Perm. Impact: 0.014 acres
Temp. Impact: 0 acres
Crossing Type: HDD
E&S Sheet: ES-6.20 **Permit:** Individual

Stream S-I1, Ephemeral
UNT to Chester Creek
Chapter 93: Drains to TSF, MF
PAFBC: Drains to ATW, STS
Coordinates: 39.8944, -75.4317
Stream Impact: 28ft² **E&S Sheet:** ES-6.20
Perm. Floodway Impact: 0.427 acres
Temp. Floodway Impact: 0.285 acres
Crossing Type: Temporary Bridge
OHW Width: 2 **Permit:** Individual
No In-Stream Work from 3/1-6/15

Stream S-I1, Ephemeral
UNT to Chester Creek
Chapter 93: Drains to TSF, MF
PAFBC: Drains to ATW, STS
Coordinates: 39.8944, -75.4317
Stream Impact: 0ft² **E&S Sheet:** ES-6.20
Perm. Floodway Impact: 0.316 acres
Temp. Floodway Impact: 0.139 acres
Crossing Type: Open Cut Floodway
OHW Width: 2 **Permit:** Individual
No In-Stream Work from 3/1-6/15

Stream S-I3, Ephemeral
UNT to Chester Creek
Chapter 93: Drains to TSF, MF
PAFBC: Drains to ATW, STS
Coordinates: 39.8942, -75.4314
Stream Impact: 0ft² **E&S Sheet:** ES-6.20
Perm. Floodway Impact: 0.316 acres
Temp. Floodway Impact: 0.139 acres
Crossing Type: Open Cut Floodway
OHW Width: 2 **Permit:** Individual

Stream S-I3, Ephemeral
UNT to Chester Creek
Chapter 93: Drains to TSF, MF
PAFBC: Drains to ATW, STS
Coordinates: 39.8942, -75.4314
Stream Impact: 0ft² **E&S Sheet:** ES-6.20
Perm. Floodway Impact: 0.427 acres
Temp. Floodway Impact: 0.285 acres
Crossing Type: HDD Floodway
OHW Width: 2 **Permit:** Individual

Stream S-I2, Perennial
UNT to Chester Creek
Chapter 93: TSF, MF
PAFBC: Drains to ATW, STS
Coordinates: 39.8942, -75.4314
Stream Impact: 476ft² **E&S Sheet:** ES-6.20
Perm. Floodway Impact: 0.316 acres
Temp. Floodway Impact: 0.139 acres
Crossing Type: Open Cut PPP1/Bore PPP2
OHW Width: 7 **Permit:** Individual
No In-Stream Work from 3/1-6/15

Stream S-I2, Perennial
UNT to Chester Creek
Chapter 93: TSF, MF
PAFBC: Drains to ATW, STS
Coordinates: 39.8942, -75.4314
Stream Impact: 1,078ft² **E&S Sheet:** ES-6.20
Perm. Floodway Impact: 0.427 acres
Temp. Floodway Impact: 0.285 acres
Crossing Type: HDD/Temporary Bridge
OHW Width: 7 **Permit:** Individual
No In-Stream Work from 3/1-6/15

Stream S-I2, Perennial
UNT to Chester Creek
Previous Permit Modifications

Stream Impact: 805ft²
Crossing Type: Open Cut

Temp. Impact: 0.527 acres
Crossing Type: IR Containment

Stream S-I4, Perennial
Chester Creek
Chapter 93: TSF, MF
PAFBC: ATW, STS
Coordinates: 39.8932, -75.4312
Stream Impact: 0ft² **E&S Sheet:** ES-6.20
Perm. Floodway Impact: 0.316 acres
Temp. Floodway Impact: 0.139 acres
Crossing Type: Open Cut Floodway
OHW Width: 70 **Permit:** Individual

Stream S-I4, Perennial
Chester Creek
Chapter 93: TSF, MF
PAFBC: ATW, STS
Coordinates: 39.8932, -75.4312
Stream Impact: 0ft² **E&S Sheet:** ES-6.20
Perm. Floodway Impact: 0.427 acres
Temp. Floodway Impact: 0.285 acres
Crossing Type: HDD Floodway
OHW Width: 70 **Permit:** Individual

Stream S-I4, Perennial
Chester Creek
Previous Permit Modifications

Temp. Impact: 0.527 acres
Crossing Type: IR Containment

Stream S-I4, Ch. 106 area
Chester Creek
Coordinates: 39.8932, -75.4312
Perm. Floodplain Impact: 0.465 acres
Temp. Floodplain Impact: 0.419 acres
Crossing Type: HDD/Open Cut

ATWS for equipment storage and staging area for HDD.

Middletown Township
DELAWARE COUNTY

Aston Township
DELAWARE COUNTY

DE-163 DE-167 DE-630 DE-165 DE-166 DE-171 DE-610 DE-600 DE-172 DE-169 DE-170 DE-174 DE-173 PENNELL RD

Legend

- Sheet Boundary
- PPP 1
- PPP 2
- PPP 1, Bore
- PPP 1, HDD
- PPP 1, Direct Pipe
- PPP 2, Bore
- PPP 2, HDD
- PPP 2, Direct Pipe
- Pullback String
- Permanent Easement (no surface disturbance)
- Permanent ROW
- Temporary ROW
- ATWS
- Permanent Access Road
- Temporary Access Road
- ROW-Travel LOD
- ROW-Travel and Clearing LOD
- Existing Block Valve
- New Block Valve
- Block Valve Setting LOD
- Station LOD
- Bore Pits
- PEM Wetland
- PFO Wetland
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- Pond
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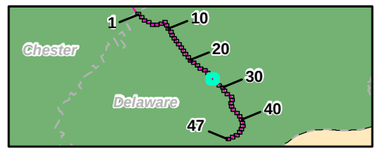

N

0 25 50 100 150 200

1 inch = 100 feet

Site Plan for the Sunoco Pennsylvania Pipeline Project, Delaware County, PA.
Sheet 27 of 47

Prepared By: TETRA TECH

Date: 06/2020

Base Map; SPLP 2014-2016, Roads from NRCS Geo-spatial Data Giveaway, 100-Year Floodplain from FEMA NFHL, downloaded 9/2016. Aquatics, TT 2013-2016.

Coordinate System: NAD 83 Stateplane, PA South, Feet

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3150-PM-BWEW0557 Rev 4/2018
Application

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATERWAYS ENGINEERING AND WETLANDS

Applicant's Name / Client Sunoco Pipeline LP

AQUATIC RESOURCE IMPACT TABLE
FOR PENNSYLVANIA CHAPTER 105 WATER OBSTRUCTION AND ENCROACHMENT APPLICATION / REGISTRATION

Project / Site Name: Pennsylvania Pipeline Project: Glen Riddle HDD #S3-0620 Modification Date: Revised 06/04/2020

DEP USE ONLY			Project Information									PADEP / 105		
PADEP Permit Number	Single Complete Crossing No.	Crossing Number	Fee	Structure / Activity unique identifier	Aquatic Resource Type	Latitude dd nad83	Longitude dd nad83	Waters Name	PA Code Chapter 93 Designation	Work Proposed	DEP Impact Type temp / perm	Watercourse Impact Top of Bank to Top of Bank Length and Width in feet	Floodway Impact Top of Bank Landward Length and Width in feet	Wetland Impact Dimension Length and Width in feet
			see supporting tables	I1	PEM	39.9945	-75.4320	Wetland	n/a	Excavation	Perm	N/A	N/A	199 - 50
			see supporting tables	I1	PEM	39.9945	-75.4320	Wetland	n/a	Fill	Temp	N/A	N/A	199 - 64
			see supporting tables	S-I2	Perennial	39.8942	-75.4314	UNT to Chester Creek	TSF, MF	Excavation	Perm	68 - 7	N/A	N/A
			see supporting tables	S-I1, S-I2, S-I3, S-I4 Ch. 105 Area	Floodway	39.8942	-75.4314	UNT to Chester Creek; UNT to Chester Creek; UNT to Chester Creek; Chester Creek	Drains to TSF, MF; TSF-MF; Drains to TSF, MF; TSF, MF	Excavation	Perm	N/A	475 - 109	N/A
			see supporting tables	S-I1, S-I2, S-I3, S-I4 Ch. 105 Area	Floodway	39.8942	-75.4314	UNT to Chester Creek; UNT to Chester Creek; UNT to Chester Creek; Chester Creek	Drains to TSF, MF; TSF-MF; Drains to TSF, MF; TSF, MF	Fill	Temp	N/A	350 - 167	N/A

PADEP Impact Type: temporary or permanent.

Permanent Impacts are those areas affected by a water obstruction or encroachment that consist of both direct and indirect impacts that result from the placement or construction of a water obstruction or encroachment and include areas necessary for the operation and maintenance of the water obstruction or encroachment located in, along or across, or projecting into a watercourse, floodway or body of water.

Temporary Impacts are those areas affected during the construction of a water obstruction or encroachment that consists of both direct and indirect impacts located in, along or across, or projecting into a watercourse, floodway or body of water that are restored upon completion of construction. This does not include areas that will be maintained as a result of the operation and maintenance of the water obstruction or encroachment located in, along or across, or projecting into a watercourse, floodway or body of water (these are considered permanent impacts).

Table 1. Wetland Impact Summary for the Mariner East 2 Glen Riddle HDD Redesign – Delaware County – 03/21/2019

Wetland ID	Cover Class[1]	Coordinates	PADEP Permanent Impact (acre)[2]	PADEP Temporary Impact (acre)[2]
I1	PEM	39.9945, -75.4320	0.201	0.191
1 wetland			**0.201 acre**	**0.191 acre**

[1] Field classification based on Cowardin et al. 1979.

[2] Permanent and temporary impacts calculated in accordance with the PADEP impact calculation instructions. The presented acreage is the proposed impact for each resource calculated by GIS analysis, (rather than length x width) and provides a more accurate summation of impacts and therefore the fee calculation for Chapter 105 permitting.

Table 2. Waterbody Impact Summary for the Mariner East 2 Glen Riddle HDD Redesign – Delaware County – 03/21/2019

Stream ID	Stream Name	Coordinates	Stream Permanent Impact (sq. ft.)[1]	Stream Temporary Impact (sq. ft.)[1]	PADEP Permanent Floodway Disturbance (acre)[1, 2]	PADEP Temporary Floodway Disturbance (acre)[1, 2]
S-I1	UNT to Chester Creek	39.8944, -75.4317	-	-	0.316	0.139
S-I2	UNT to Chester Creek	39.8942, -75.4314	476	-		
S-I3	UNT to Chester Creek	39.8942, -75.4314	-	-		
S-I4	Chester Creek	39.8932, -75.4312	-	-		
3 streams			**476 sq. ft.**	**0 sq. ft.**	**0.316 acre**	**0.139 acre**

[1] Permanent and temporary impacts calculated in accordance with the PADEP impact calculation instructions. The presented acreage is the proposed impact for each resource calculated by GIS analysis, (rather than length x width) and provides a more accurate summation of impacts and therefore the fee calculation for Chapter 105 permitting.

[2] Floodway disturbance includes the stream impacts within the calculations, i.e. the floodway disturbance is the total proposed disturbance according to Chapter 105 regulations.

Table 3. Impact Fee Calculation for the Mariner East 2 Glen Riddle HDD Redesign – Delaware County – 03/21/2019

Component	Sum or Total (acre or dollars)
PADEP Permanent Impacts to Wetlands	0.201
PADEP Temporary Impacts to Wetlands	0.191
PADEP Permanent Impacts to Streams	0.316
PADEP Temporary Impacts to Streams	0.139
Total Proposed PADEP Permanent Impacts[1]	**0.517**
Total Proposed PADEP Temporary Impacts[1]	**0.330**
Permanent Impact Fee	$4,800
Temporary Impact Fee	$1,600
Chapter 105 Administrative Fee	$500
Total Chapter 105 Review Fee	**$6,900**

[1] This total is rounded up to the next tenth of an acre to calculate fees in accordance with PADEP guidance.

Attachment II

APPROVALS

- APPROVAL OF TIMBER MAT BRIDGE SHIFT BY DCCD FROM MICHELLE WHEELER ON 5/26/17 (SEE REVISION 3)
- SEE PADEP APPROVED DELAWARE COUNTY CONSERVATION DISTRICT SITE SPECIFIC SITE RESTORATION PLANS UNT TO CHESTER CREEK (S-I2) DRAWING SET, CH. 102 AND CH. 105 RESTART AUTHORIZATION AND RESTORATION PLAN APPROVAL VIA JOHN HOHENSTEIN LETTER DATED 4/5/18. (SEE REVISION 4)
- JOHN HOHENSTEIN OF SERO PADEP APPROVAL OF 620 HDD SHORT AND STATION CONNECTION VIA LETTER DATED 10/3/18. (SEE REVISION 5)
- CH. 102 AND CH. 105 RESTORATION AND MONITORING PLAN FOR WETLAND WL-I1 AND STREAM S-I2 APPROVAL LETTER FROM JOHN HOHENSTEIN ON 11/5/18 (SEE REVISION 6)

REVISION 7, 8, 9, & 10 ONLY REDLINED FOR REVIEW PURPOSES

MATCHLINE ES-6.19

MARTINS LANE

EXISTING PERMANENT ACCESS ROAD NO PROPOSED IMPROVEMENTS (ID# PPP-AR-170))

100-YEAR FEMA FLOODPLAIN (TYP.)

EXISTING DRIVEWAY

GLENN RIDDLE ROAD

PAVED ENTRANCE OFF GLENN RIDDLE ROAD

TEMPORARY ACCESS ROAD (IN PAVED PARKING LOT)

PAVED AREA

AREA TO BE BORED (REVISION 7)

TEMPORARY ACCESS ROAD

PAVED AREA

PAVED ENTRANCE OFF GLENN RIDDLE ROAD

WOODED AREA

WELL VEGETATED AREA

PFO WL-I1

PEM WL-I1

UNT TO CHESTER CREEK (TSF)

S-I1

SC-I3

ORANGE CONSTRUCTION FENCE (SEE REVISION 10)

BORE PITS

EXISTING ASPHALT DRIVEWAY

PFO WL-I2

SEE STREAM & RIP-RAP INSERT

REQUEST TO RELOCATE TEMPORARY TIMBER MAT BRIDGE CROSSING. ONE ADDITIONAL 8- INCH BOX ELDER TREE WILL BE CUT. STUMP AND ROOT BALL LEFT IN PLACE FOR STREAM BANK STABILIZATION. NO IN-STREAM IMPACTS.

REQUESTED LOCATION CROSSES STREAM PERPENDICULAR TO STREAM S-I2 AND PREVENTS CROSSING AN EXISTING PIPELINE VENT.

PREVIOUSLY APPROVED LOCATION OF HDD BEING PROPOSED AS OPEN CUT

ORIGINALLY SUBMITTED HDD ENTRY/EXIT LOCATION

INSTALLED 16-INCH HDD ENTRY (REVISION 5)

APPROVED LOD (SEE REVISION 4)

16-INCH AREA TO BE BORED (INSTALLED REVISION 5)

INSTALLED 16-INCH HDD EXIT (REVISION 5 – REMOVED)

TEMPORARY UPSLOPE DIVERSION BERM (TYP.)

PERMANENT WATER BAR (TYP.)

HDD STAGING AREA (SEE TYPICAL LAYOUT ON SHEET ES-0.16)

COMPOST FILTER SOCK (TYP.)

TRENCH PLUGS (TYP.)

LIMIT OF DISTURBANCE

RIPARIAN FOREST BUFFER

100-YEAR FEMA FLOODWAY (TYP.)

EROSION CONTROL BLANKET (TYP.)

CHESTER CREEK (TSF)

S-I4

EARTH DISTURBANCE TO BE MINIMIZED TO THE AREA REQUIRED FOR CONSTRUCTION. TOPSOIL TO BE STRIPPED AND STOCKPILED WHERE EARTH DISTURBANCE IS REQUIRED.

ORANGE CONSTRUCTION FENCE

SEE NOTE 5 FOR REDBELLY TURTLE PROTECTION MEASURES

AASHTO #1 ROCK CONSTRUCTION ENTRANCE (TYP.)

EXISTING GRAVEL PAD

AGGREGATE STOCKPILE (TYP)

EXISTING 12" BLOCK VALVE STATION

TEMPORARY EQUIPMENT CROSSING (TYP.)

ADDITIONAL TEMPORARY WORK SPACE FOR CONTRACTOR USE (I.E., STAGING, PARKING, SOIL STOCKPILING, OR OTHER USES)

STREAM BANK RESTORATION (TYP.)

APPROVED LOD (SEE REVISION 4 – REMOVED, SEE REVISION 6)

TEMPORARY SLOPE PIPE (TYP.) SLOPE PIPE NO LONGER REQUIRED

PREVIOUSLY PROPOSED RIPRAP, NO LONGER PLANNED

MIDDLETOWN TOWNSHIP

ASTON TOWNSHIP

MATCHLINE ES-6.21

STREAM & RIP-RAP INSERT

EXISTING RIPRAP TO REMAIN

EXISTING RIPRAP TO BE RESTORED AFTER 20-INCH INSTALLATION

PREVIOUSLY PROPOSED RIPRAP, NO LONGER PLANNED

0 25 50 SCALE IN FEET

0 50 100 SCALE IN FEET

NOTES:

1. SEE ES-0.01 & ES-0.02 FOR GENERAL NOTES & LEGEND.
2. SEE ES-0.03 FOR STREAM & WETLAND CROSSING TABLES.
3. EROSION & SEDIMENT CONTROL BMP INSTALLATION TO BE ADJUSTED AS NEEDED TO ACCOMMODATE ACTUAL CONTOURS IDENTIFIED IN FIELD DURING VARIOUS PHASES OF THE PROJECT.
4. STRAY LIGHT WILL BE MINIMIZED DURING NON-DAYLIGHT OPERATIONS BY USING DIRECTIONAL LIGHTING ANGLED AWAY FROM HOMES AND TRAFFIC TO THE EXTENT PRACTICABLE. SOUND BARRIERS AND/OR SOUND CURTAINS WILL BE PROVIDED DURING DRILLING.
5. TO AVOID POTENTIAL CONFLICTS WITH REDBELLY TURTLES A BARRIER SHOULD BE MAINTAINED IN BETWEEN THE PROJECT LOD AND CHESTER CREEK. PRIOR TO CONSTRUCTION IN VICINITY OF THE UNNAMED TRIBUTARY TO CHESTER CREEK, THE PROJECT AREA SHOULD BE CHECKED AND CLEARED FOR REDBELLY TURTLES. ANY REDBELLY TURTLE FOUND ON SITE SHOULD BE PHOTOGRAPHED AND RELOCATED TO THE NEAREST AQUATIC HABITAT. ADDITIONALLY, THE PFBC MUST BE CONTACTED WITHIN 48 HOURS OF THE FIND.
6. THE PERMITTEE AND CO-PERMITTEE WILL COMPLY WITH ALL REQUIREMENTS OF TITLE 25 PA. CODE § 102.8(N), INCLUDING APPLICABLE SUBSECTIONS (B), (C), (E), (F), (H), (I), (L), AND (M), CONSISTENT WITH THE REQUIREMENTS AND CONDITIONS PRESENTED IN THE PENNSYLVANIA PIPELINE PROJECT'S CHAPTER 102 EROSION AND SEDIMENT CONTROL PERMIT ESG0100015001 AND ANTIDEGRADATION ANALYSIS.

TETRA TECH
www.tetratech.com
661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

REVISIONS

NO.	BY	DATE	REMARKS
4	RS	1/31/18	ADDITIONAL LOD AND E&S CONTROLS ADDED–SEE SITE SPECIFIC DRAWING SET
5	RS	8/16/18	16" HDD MODIFICATION AND BYPASS CONNECTION
6	RS	9/1/18	WETLAND AND STREAM RESTORATION UPDATE
7	RS	2/8/19	HDD CONVERTED TO CONVENTIONAL BORES & OPEN TRENCH. ADDITIONAL LOD ADDED
8	RS	1/24/20	ADDED FIELD SURVEY
9	RS	4/2/20	ADDED RIP-RAP INSERT
10	RS	6/3/20	ADDED ORANGE CONSTRUCTION FENCE

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ROBERT F. SIMCIK ENGINEER

SUNOCO PIPELINE L.P.
SINKING SPRING, PENNSYLVANIA

PENNSYLVANIA PIPELINE PROJECT CONSTRUCTION SPREAD 6

1-20" & 1-16" WELDED STEEL NATURAL GAS PIPELINES

DELAWARE COUNTY CONSERVATION DISTRICT
EROSION & SEDIMENT CONTROL &
SITE RESTORATION PLAN
SHEET 20 OF 35

DATE:	2/6/17
PROJECT NO.:	112C05958
DESIGNED BY:	JB
DRAWN BY:	BH
CHECKED BY:	RS

ES-6.20
SHEET 6.20 OF 60

R:_Marcellus Shale Projects\Sunoco\5958 – Penn Pipeline Project\18 – Delaware\E&S\Drill 620 – Option 2\E&S\5958ES006.20–Insert (2).dwg PIT NICHOLE.NAJESKI 6/3/2020 12:00:19 PM

Attachment III

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

Negative Survey Form

(This form may be used if the Phase I guidelines have been followed and no cultural resources have been identified.)

1. Project Identification:

ER Number 2013-1862-042

Project Name &/or Agency Tracking #: Pennsylvania Pipeline Project

Agency: PADEP **Applicant:** Tetra Tech

Preparers Name and affiliation: Rob Peltier/Tetra Tech, Inc.

Date Prepared: 4/18/19

Project Area County/Municipality (list all)

County	Municipality
Delaware County	Middletown Twp.

2. Project Setting: (check all that apply)

☒ urban/suburban; ☐ rural
☒ upland; ☒ floodplain/terrace (☒active; ☐stable terrace)

7.5" USGS Quadrangle(s) Name (list all):

Name	Date
Media	1999

Physiographic Zone(s)(list All. Use DCNR Map 13 compiled by W.D. Sevon, Fourth Edition, 2000.):

Physiographic Zone
Piedmont Upland (39)

Project Area Drainage(s), (list all) (Sub-basin and Watershed can be obtained from CRGIS):

Sub-basin	Watershed	Major Stream	Minor Stream
3	G	Lower Delaware River	

3. Basic Field Conditions:

(Text fields will expand as needed. Please be complete)

Area of APE / Project Area in hectares: 2.23 ha subject to shovel testing and pedestrian survey

General Description of APE / Project Area: Survey area consists of all new workspace associated with the conversion from HDD to a direct pipe, a conventional auger bore under Glen Riddle Road, and conventional open trench construction through a wetland and stream crossing.

Type of Proposed Project / Impact: HDD conversion to direct pipe/Conventional auger/Conventional open trench

Date of field investigation(s): 4/2/2019

Description of Field Conditions including percentage of surface visibility:
Cool and sunny field conditions. Low grass with a 60 percent surface visibility.

4. Previously Recorded Archaeological Sites within APE / Project Area and not relocated by this project:

PASS Site Number	Reason not re-located

5. Survey Methodology: (check all that apply to the entire project; attach any supporting documents)

☒ PASS file Research ☐ Contacted Local Historical Association/Commission/Park/Etc.
☐ Informant Data ☒ Historic Records/Maps/Photos ☐ SCS Soil Maps
☐ Surface Survey ☐ Geomorphological Borings ☒ STPs
☐ Test Units ☐ Geomorphological Trenches ☐ Remote Sensing
Other: Pedestrian Walkover Survey

Professional Geomorphologist was ☐Present or ☒ Not Present During Field Investigations

Name: _____ Affiliation: _____

Formal Geomorphological Report Prepared: ☐ Yes ☒ No

6. Results: (Describe both the design and the results of every methodology checked in **5.** Include the size and condition of the area tested by each.)

No cultural resources identified. Details provided below.

7. Statewide Pre-Contact Probability Model Analysis: (Use the model from CRGIS to determine portions of the project area that were located within each sensitivity tier and list all testing methods used within each tier. If more than one method was used, estimate the percentage of the tier tested by each method. In the Sites Located section, include Isolated Finds for which a number is assigned.)

Sensitivity Tier	Area within this Tier	Percent of Total Project Area	Method(s) Used to test this tier (Use list from 5 above. Include % if multiple.)	Number of Sites Located
High	3200 sq. m.	23%	Shovel Testing 80%, Pedestrian Walkover 20%	0
Moderate	4657 sq. m.	33 %	Pedestrian Walkover 80%, Shovel Testing 20%	0
Low	6101 sq. m.	44%	Shovel Testing 80%, Pedestrian Walkover 20%	0

8. Required Attachments:

☒ 7.5' USGS Quadrangle Map delineating APE / Project Area
☒ Project map showing testing strategy(ies)
☐ Testing strategy justification / predictive model
☒ Supporting photographs with descriptions of view and view direction
☐ Engineering / Project Plans if prepared
☐ Geomorphological Report if prepared
☒ Representative excavation profiles and description

List all other attachments to this Negative Survey Form:

Attachment Type
Attachment A – Project Location on USGS
Attachment B – Phase I Archaeological Investigations
Attachment C – Project Photographs/Locations Map
Attachment D – Shovel Test Summary

ER 2013-1862-042
GLEN RIDDLE / 0620 MODIFICATION AREA
MIDDLETOWN TOWNSHIP, DELAWARE COUNTY
MODIFICATION DESCRIPTION and SURVEY RESULTS

Sunoco Pipeline L.P. (SPLP) requests a major permit modification for a change in the installation method of the 20-inch and portions of the 16-inch diameter pipelines previously permitted as the 0620 Horizontal Directional Drill (HDD) in Middletown Township, Delaware County. This permit request is to convert the HDD to a direct pipe through residential and commercial areas along Wildwood Avenue, South Pennell Road, Riddlewood Drive, War Trophy Lane, Glenn Riddle Road, and the Southeast Pennsylvania Transportation Authority's (SEPTA) Railroad, in Middletown Township, Delaware County. The modification includes a conventional auger bore under Glen Riddle Road and the SEPTA railroad and conventional open trench construction through a delineated wetland (WL-11) and a stream (S-I2).

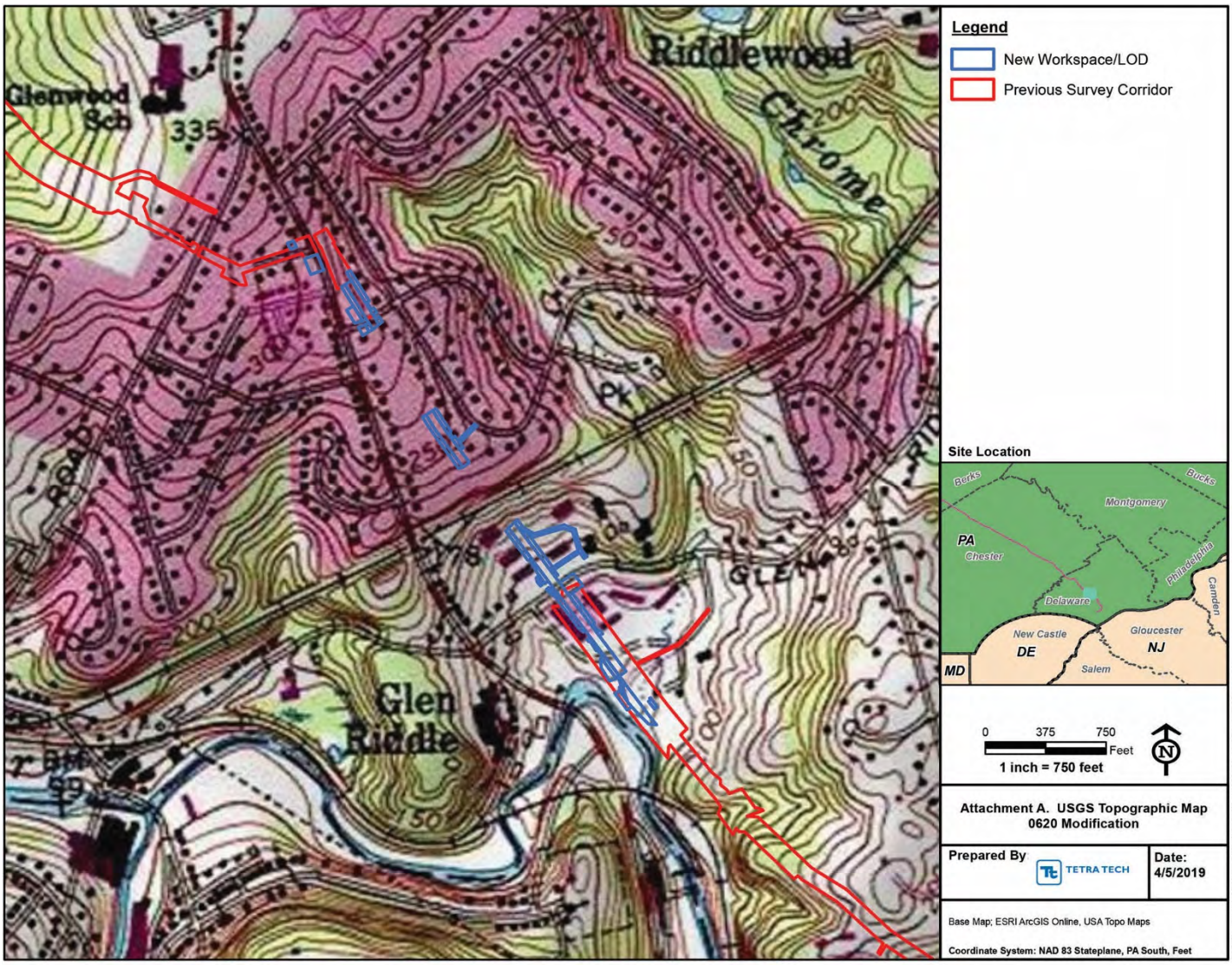
A desktop review, background research, and site file search were conducted for the Glen Riddle modification prior to field reconnaissance and survey. Background research indicated that a some of the required workspace, the modification's Limit of Disturbance (LOD) or Area of Potential Effect (APE) has been previously surveyed for cultural resources.

The total APE for the modification area is approximately 5.52 acres (ac) (2.23 hectares [ha]). Approximately 2.07 ac (0.84 ha) of the total APE had been previously surveyed by Tetra Tech in 2015. These areas were subjected to photodocumentation and limited opportunistic shovel testing. The remaining 3.45 ac (1.40 ha) of testable APE was subject to systematic subsurface shovel testing, pedestrian survey, and photodocumentation. Tetra Tech conducted a Phase I archaeological survey of the modification area on April 2nd, 2019. An existing utility corridor and temporary access road west of War Trophy Lane and adjacent to existing residences was tested with eight shovel tests. Shovel tests X1 thru X6 revealed a brown (7.5YR 4/3) silty loam Ap-horizon to an approximate depth of 22 centimeters below surface (cmbs). Beneath, a brown (7.5YR 5/4) silty clay loam B-horizon was encountered. Shovel test X2 contains fill materials. Shovel tests X7 and X8 revealed a brown (10YR 4/2) silty loam Ap-horizon, and a yellowish brown (10YR 5/6) silty clay loam B-horizon with an approximate interface depth of 15 cmbs. Areas adjacent to the intersection of Wildwood Avenue and South Pennell Road were subjected to seven shovel tests (X9 through X15). These shovel tests were determined to be disturbed and comprised of varying levels of fill. Areas along the north and south side of Riddlewood Drive were tested with ten shovel tests (X16 through X25). On the northside of Riddlewood Drive, shovel tests X16 thru X23 revealed a brown (10YR 4/4) silty loam Ap-horizon to an approximate depth of 21 cmbs. Beneath, a yellowish brown (10YR 5/6) silty clay loam B-horizon was encountered. Shovel test X19 contained fill materials. Two shovel tests (X24 and X25) were excavated on a somewhat flat area on the south side of Riddlewood Drive. Shovel tests X24 and X25 exhibited similar soil profiles as the tests X16 through X23. Two opportunistic shovel tests (X26 and X27) were excavated on somewhat flat terrain adjacent to Martin's Lane within a previously surveyed location. Approximately 147 ft (45 m) southwest of test X27, a final shovel test (X28) was excavated in a location adjacent to a Chester Creek. Shovel Test X28 was excavated to a depth of 103 cmbs and exhibited a typical floodplain profile. Shovel test results can be viewed in Attachment D. In addition to the shovel testing, each location within the APE was subjected to a full pedestrian survey and photodocumentation.

No cultural material or archaeological sites were identified during the Phase I archaeological survey and no further cultural resource investigations are recommended. The construction modification, as proposed, will have no adverse effect on cultural resources.

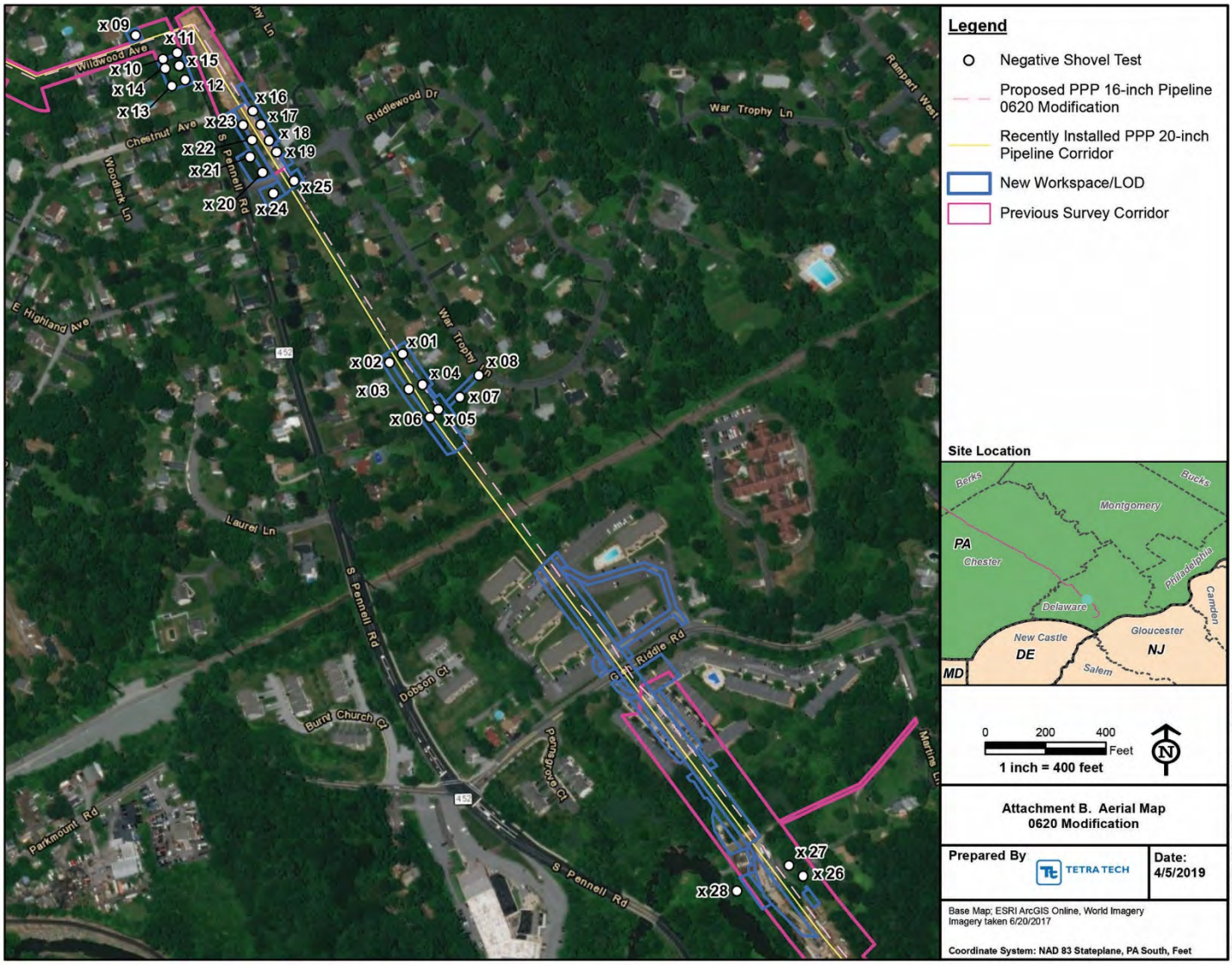
Attachment A includes the Glen Riddle/0620 modification area on a USGS topographic map. Attachment B also depicts the proposed LOD/APE, as well as previously surveyed areas. Attachment C1 offers representative photographs of the Glen Riddle/0620 modification area, while photograph locations are depicted on Attachment C2. Attachment D is a table containing shovel test profiles.

Attachment A: Glen Riddle Modification Area on USGS Topographic Map



Negative Survey Form

Attachment B: Phase I Archaeological Investigations



Attachment C1: Project Photographs

1. View of APE within existing utility corridor, west of adjacent residences along War Trophy Lane. Area subjected to subsurface investigations. Facing northwest.

2. View of APE within existing utility corridor, west of adjacent residences along War Trophy Lane. Area subjected to subsurface investigations. Facing northwest.

3. View an existing utility corridor outside of APE, west of War Trophy Lane. Area subjected to pedestrian survey. Facing southeast.

4. View of temporary access road perpendicular to War Trophy Lane. Area subjected to subsurface investigations. Facing southwest.

5. View of APE adjacent to the intersection of Wildwood Avenue and South Pennell Road. Area subjected to subsurface investigations and determined to be disturbed. Facing north.

6. View of APE north of Riddlewood Drive. Area subject to subsurface investigations along the corridor perimeter. Facing northwest.

7. View of APE south of Riddlewood Drive. Area subject to subsurface investigations. Facing southwest.

8. View of APE south of Riddlewood Drive. Area subject to subsurface investigations. Facing southeast.

9. View of APE north of Riddlewood Drive. Area subjected to subsurface investigations. Facing northwest.

10. View of APE north of Glenn Riddle Road (Glenn Riddle Station Apartments). Area impacted by modern development, subjected to pedestrian and photodocumentation. Facing southeast.

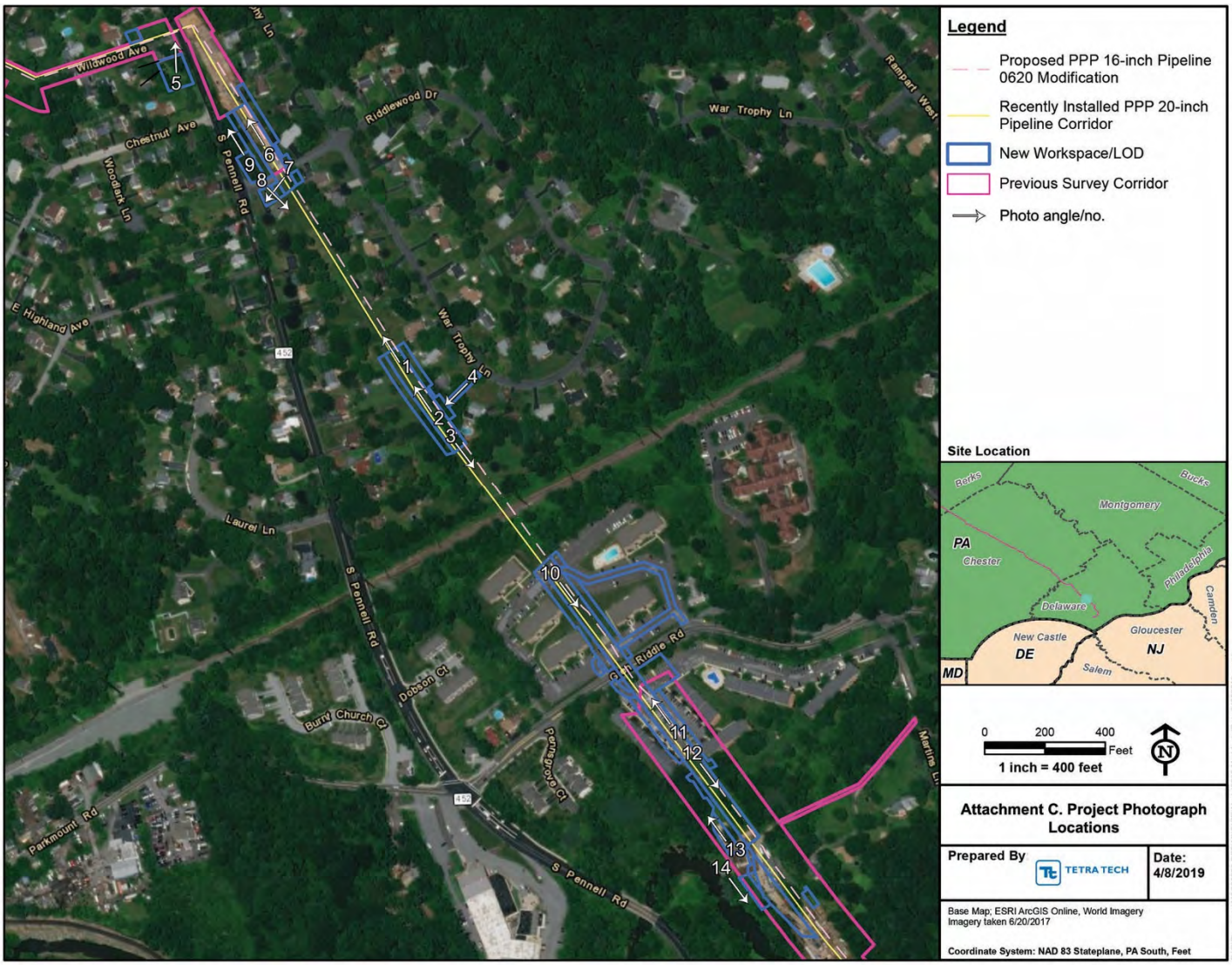
11. View of area south of Glen Riddle Road, within previously surveyed location. Area subject to pedestrian walkover and photodocumentation. Facing northwest.

12. View of area south of Glen Riddle Road, within previously surveyed location. Area was subjected to two opportunistic shovel tests. Facing southeast.

13. View of area south of Glen Riddle Road and west of Martin's Lane, previously surveyed area. Area subject to limited shovel testing and pedestrian walkover and photodocumentation. Facing northwest.

14. View of area south of Glen Riddle Road, west of Martin's Lane, and east of Chester Creek. Although area was previously surveyed, limited shovel testing was conducted. Facing southeast.

Attachment C2: Project Photograph Locations



Attachment D: Shovel Test Summary

Shovel Test	Strat/Level	Depth (cm)	Soil	Notes
X1	1	0-38	7.5YR 4/3 Si Lo	Rocky
	2	38-48	7.5YR 5/4 Si Cl Lo	
X2	1	0-21	10YR 4/6 Cl Lo	Disturbed
	-	21+	-	FILL
X3	1	0-23	7.5YR 4/3 Si Lo	Rocky
	2	23-33	7.5YR 5/6 Si Cl Lo	
X4	1	0-21	7.5YR 4/3 Si Lo	Rocky
	2	21-31	7.5YR 5/4 Si Cl Lo	Rocky
X5	1	0-22	7.5YR 4/3 Si Lo	
	2	22-33	7.5YR 5/4 Si Cl Lo	
X6	1	0-19	7.5YR 4/3 Si Lo	
	2	19-30	7.5YR 5/4 Si Cl Lo	Rocky
X7	1	0-20	10YR 4/2 Si Lo	
	2	20-30	10YR 5/6 Si Cl Lo	
X8	1	0-10	10YR 4/2 Si Lo	
	2	10-26	10YR 5/6 Si Cl Lo	
X9	1	0-26	10YR 4/4 mottled w/ 10YR 3/2 Cl Lo	FILL
	2	26-40	10YR 5/4 mottled w/ 10YR 3/2 Si Cl Lo	FILL
X10	1	0-10		FILL
	-	10+	-	ROCK IMPASSE
X11	1	0-20	10YR 4/4 mottled w/ 10YR 3/2 Cl Lo	FILL
	2	20-38	10YR 5/6 mottled w/ 10YR 3/2 Si Cl Lo	FILL
	-	38+	-	ROCK IMPASSE
X12	1	0-30	10YR 5/4 mottled w/ 10YR 3/2 Si Cl Lo	FILL
	-	30+	-	ROCK IMPASSE
X13	1	0-42	10YR 5/4 mottled w/ 10YR 3/2 Si Cl Lo	FILL
	-	42+	-	ROCK IMPASSE
X14	-	-	-	FILL/GRADED LOT
X15	-	-	-	FILL/GRADED LOT
X16	1	0-19	10YR 4/4 Si Lo	
	2	19-30	10YR 6/4 Si Cl Lo	
X17	1	0-21	10YR 4/4 Si Lo	
	2	21-31	10YR 6/4 Si Cl Lo	
X18	1	0-12	10YR 4/4 Si Lo	
	2	12-23	10YR 5/6 Si Cl Lo	
X19	-	-	-	FILL
X20	1	0-24	10YR 4/4 Si Lo	
	2	24-36	10YR 5/6 Si Cl Lo	
X21	1	0-20	10YR 4/4 Si Lo	
	2	20-30	10YR 5/6 Si Cl Lo	
X22	1	0-21	10YR 4/4 Si Lo	
	2	21-31	10YR 5/6 Si Cl Lo	
X23	1	0-19	10YR 4/4 Si Lo	
	2	19-31	10YR 5/6 Si Cl Lo	
X24	1	0-31	10YR 4/4 Si Lo	
	2	31-42	10YR 3/3 Si Lo	
	3	42-55	10YR 5/6 Si Cl Lo	
X25	1	0-23	10YR 4/4 Si Lo	
	2	23-33	10YR 5/6 Si Cl Lo	
X26	1	0-41	10YR 4/3 Si Lo	
	2	41-51	10YR 5/6 Si Cl Lo	
X27	1	0-36	10YR 4/3 mottled w/ 10YR 3/2 Si Lo	
	2	36-46	10YR 5/6 mottled w/ 10YR 6/4 Si Cl Lo	
X28	1	0-60	10YR 4/4 Si Lo	
	2	60-90	10YR 4/3 Sa Lo	WET
	3	90-103	7.5 YR 4/4 Sa Cl	COBBLES

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

May 21, 2019

Tetra Tech
Attn: Rob Peltier, M.A., RPA
301 Ellicott Street
Buffalo, NY 1420

RE:ER 2013-1862-042-II – DEP: Pennsylvania Pipeline Project, Negative Survey Form for Glenn Riddle/0620 Modification Area, Middletown Township, Delaware County

Dear Mr. Peltier:

Thank you for submitting the Negative Survey Form for the above referenced project. The Pennsylvania State Historic Preservation Office (PA SHPO) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

Based on the negative results of this investigation, we agree with the recommendation that no further archaeological work is necessary within the surveyed area.

If you have any questions or comments concerning our review, please contact Mark Shaffer at mshaffer@pa.gov or (717) 783-9900.
Sincerely,

Douglas C. McLearen, Chief
Division of Environmental Review