535 Fritztown Road
Sinking Spring, PA 19608

October 3, 2019

Via Electronic Mail
Dana Drake, P.E.
Environmental Program Manager
Waterway and Wetlands Program
Pennsylvania Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222-4745

Re: Horizontal Directional Drill Reevaluation Report
Enhanced Alternative Crossing 5 Discussion
Loyalhanna Lake Crossing (HDD No. S2-0010)
Permit No. E65-973
Loyalhanna Township, Westmoreland County

Dear Ms. Drake:

In compliance with the Corrected Stipulated Order dated August 10, 2017 a Reevaluation Report on the above-referenced horizontal directional drill (HDD) was submitted to the Department on August 17, 2018. In meeting on March 28, 2019 concerning this HDD, the Department requested additional information and analysis, to which Sunoco Pipeline LP (SPLP) submitted a letter response to the Department with the requested additional information on April 11, 2019. On August 21, 2019, the Department noted that it reviewed the supplemental information, and requested a more detailed evaluation of Alternative Crossing 5 (hereafter referred to as Alternative 5), including information related to landowners, public and private water supplies, streams and wetlands, slope mitigation measures, and feasibility of trenchless technologies to cross Loyalhanna Creek, associated with this alternative route. These requested items are bolded below followed by the response.

Alternative 5 Route Revisions

As part of SPLP's evaluation of Alternative 5 (open cut construction method only, and combination open cut/trenchless construction method), SPLP performed a more detailed desktop review of the originally-developed Alternative 5 routing alignment presented in SPLP's letter to the Department dated April 11, 2019. As a result of this review, SPLP developed a revised alignment for Alternative 5 that still avoids crossing United States Army Corps of Engineers (USACE) property, Bush Recreation Area, and Loyalhanna Lake, as well as developed an HDD (and other trenchless) construction method plan, with consideration and incorporation of:

- best engineering design practices;
- accommodation of an HDD or other alternative trenchless construction methods to install the 16-inch-diameter pipeline beneath Loyalhanna Creek;

- known areal extent and classification of existing Department-regulated wetlands, waterbodies, and floodplains/floodways, and objective to avoid or minimize the areal extent of surface disturbance to these resources;
- known areal extent and protection requirements of existing agency-regulated significant land use, cultural, and human environment resources, and objective to avoid or minimize surface disturbance to these resources;
- known location and areal extent of existing structures and obstacles (e.g., residences, outbuildings, roadways);
- known existing topographic, geologic, and hydrogeologic conditions and constraints at and below the ground surface; and
- given these conditions and constraints, the objective to use the minimum Alternative 5 alignment length (potentially) practicable.

Therefore, this theoretical desktop alternative represents the most (potentially) practicable open cut or combination open cut/trenchless crossing alternative alignment available based on cost, existing technology, and logistics. A plan view drawing depicting this revised Alternative 5 alignment is provided in Exhibits 2, 6, and 7. SPLP used this revised Alternative 5 alignment to respond to the Department's requests, including assessment of the feasibility of utilizing trenchless technologies to cross Loyalhanna Creek.

1. **Provide information related to property owners that will potentially be affected by the reroute. This information should include identification of all property owners, property boundaries, and location of any public and private water supply sources.**

Property Owners and Boundaries

SPLP has identified all property owners and property boundaries that would be potentially affected by the Alternative 5 route. Exhibit 1 presents a table listing all affected property owners and Exhibit 2 presents a figure depicting the boundaries of the associated properties. As identified in the table and figure, the Alternative 5 route traverses a total of 60 individual land parcels (tracts) inclusive of 45 individual private landowners (not including public road crossings), of which 56 tracts and 41 individual private landowners would be newly affected by the Pennsylvania Pipeline Project (PPP).

SPLP has minimized affecting new landowners on the PPP by selecting routes that are co-located with existing utility or other disturbances and possess low population densities, to the extent practicable. In addition, where new landowners have been affected, SPLP has attempted to minimize the use eminent domain to acquire property easements. However, because the majority of Alternative 5 is a greenfield route (not co-located with existing utility or other disturbed corridors) and possesses areas of moderate to high population density, it is very likely SPLP would be required to use eminent domain to acquire property easements via condemnation proceedings on a substantial portion of the newly affected landowners. Although it is not possible to determine the actual extent of condemnation proceedings without conducting direct landowner consultation and completing the easement acquisition process, approximately 30% of newly affected landowners on other greenfield portions of the PPP right-of-way have required condemnation proceedings. For the Alternative 5 route, this percentage would equate to condemnation proceedings on approximately 17 tracts and 12 newly affected landowners, which will likely result in significant logistical challenges, substantially increased impact on private landowners, material increased

project costs associated with legal proceedings and easement acquisition, and major delays to the project construction and in-service schedule.

Public and Private Water Supply Sources

SPLP has identified public water suppliers and private well owners in the vicinity of Alternative 5. The methodology used to research, identify, and map these resources, and results of these investigations, is provided below.

Public Water Supply Identification

The eMapPA online software was utilized to identify public water supplies (PWS) within 1 mile of the centerline of Alternative 5. PWS with a surface water intake and/or groundwater well were queried. As of August 26, 2019, no PWS supplied by a surface water intake were identified, and 14 PWS utilizing a groundwater well were identified, within 1 mile of Alternative 5. The exact locations of the identified PWS are confidential. If Alternative 5 were adopted as the permitted route, additional consultation with the 14 identified PWS would be needed to assess potential impacts to the supplier. A spreadsheet of the 14 PWS utilizing a groundwater well identified within 1 mile of Alternative 5 is included in Exhibit 3.

Private Water Well Identification

The Pennsylvania Department of Conservation and Natural Resource's PaGWIS water well data was queried to identify private water wells within 450 feet of Alternative 5. As of August 26, 2019, six (6) private water wells were identified within 450 feet of the centerline of Alternative 5. Exhibit 2 contains a figure depicting the PaGWIS water well locations within the 450-foot-wide buffer zone (as well as in the vicinity of) Alternative 5. The PaGWIS system is a helpful tool when identifying private water wells; however, previous queries of the PaGWIS data have proven to be less comprehensive than actual inquiry with the landowners. Accordingly, it is likely that additional water wells within 450 feet of Alternative 5 would be identified after landowner consultation.

2. Provide information on any additional streams and wetlands that would be impacted by the reroute.

Desktop Analysis of Wetlands and Streams Affected by Alternative 5

SPLP performed a desktop review of publicly-available databases to identify potential additional wetlands and streams that would be crossed by the Alternative 5 route. Specifically, SPLP reviewed the United States Fish and Wildlife Service's National Wetland Inventory (NWI) and the United States Geological Survey's National Hydrography Dataset (NHD) databases to identify potential wetland and stream crossings. This methodology included overlaying these geographic information system (GIS) database layers onto the Alternative 5 route centerline and preliminary workspace to identify NWI and NHD features crossed and calculate the associated temporary and permanent construction right-of-way impact area, as depicted in Exhibit 7. As Chapter 105 floodways and Chapter 106 floodplain fringe limits are not mapped due to their dependency on the stream width at the proposed impact location, SPLP used the Federal Emergency Management Agency's (FEMA's) National Flood Hazard Layer (NFHL) maps (Westmoreland County, February 3, 2016) to identify floodplains crossed and calculate the associated temporary and permanent construction right-of-way impact area. SPLP also identified the Department's classification for each identified waterbody crossing.

The Alternative 5 centerline route and preliminary workspace cross a total of six (6) NWI/NHD mapped streams. The Alternative 5 centerline route and preliminary workspace do not cross any freshwater wetland features, including emergent, scrub-shrub, or forested wetlands, mapped in the NWI. Table 1a presents the six stream crossings and associated impact analysis.

Table 1a. Open Cut Construction Method Impacts on Waterbodies for Alternative 5

Stream Name	Stream ID[1]	Stream Classification[2]	Crossing Method	Stream Impacts Perm (acres)	Stream Impacts Temp (acres)	Floodplain Impacts Perm (acres)	Floodplain Impacts Temp (acres)	Stream Intersection with Alternative 5 Route
Unnamed Tributary to Loyalhanna Creek (R4SBC)	N/A	WWF	Open Cut	0.04	0.02	-	-	40.453635, -79.462335
Loyalhanna Creek	N/A	WWF	Open Cut	0.21	0.02	0.23	0.02	40.460598, -79.448163
Unnamed Tributary to Loyalhanna Creek (R4SBC)	N/A	WWF	Open Cut	0.02	0.02	-	-	40.459556, -79.442364
Unnamed Tributary to Loyalhanna Creek (R5UBH)	N/A	WWF	Open Cut	0.05	0.03	-	-	40.456343, -79.435203
Unnamed Tributary to Loyalhanna Creek (R4SBC)	N/A	WWF	Open Cut	0.02	0.01	-	-	40.446349, -79.426722
Unnamed Tributary to Loyalhanna Creek (R4SBC)	N/A	WWF	Open Cut	0.02	0.01	-	-	40.443482, -79.417831
TOTAL				**0.36**	**0.11**	**0.23**	**0.02**	

Notes:
1 Stream identification number identified in Chapter 105 application (not applicable for Alternative 5 route).
2 Classifications: WWF – Warm Water Fishes.

All six streams would be crossed via conventional open cut construction method, and SPLP assumes the Department likely would require use of dry crossing methods for each of these streams. Under this framework, the Alternative 5 route would involve direct surface impact to approximately 0.47 acre of stream (bed and banks) and 0.25 acre of associated FEMA-mapped floodplains. As presented in SPLP's letter to the Department dated April 11, 2019, the conventional open cut construction crossing of Loyalhanna Creek would need to be accomplished using a geotube confined workspace across 2/3 of the creek channel to restrict and redirect flows around the workspace. Once flows ceased within the workspace, the trench across the enclosed portion of the creek would be excavated using a conventional track-hoe and rock hammer as necessary, and then a segment of concrete coated pipeline would be laid into the excavated trench and backfilled with the native material. The geotubes would then be deflated to restore normal flow conditions. This process would have to be repeated to the opposite bank of the creek to lay and tie-in the final length of pipeline required to complete the creek crossing.

Although the above surface disturbances to the subject stream resources (including Loyalhanna Creek) would be controlled and managed using the measures in SPLP's Impact Avoidance, Minimization, and Mitigation Plan and E&S Plan to a level that is temporary and minor, the open cut construction method requires direct surface impacts to the bed and banks of the stream associated with temporary equipment bridge installation/removal, trench excavation/backfilling, and restoration activities.

Desktop Analysis of Wetlands and Streams Affected by the Original Planned Crossing

The site-specific surveys and data used to calculate stream impacts for the Original Planned Crossing and presented in the original Chapter 105 application are not available for Alternative 5. Accordingly, to ensure an appropriate comparative analysis between Alternative 5 and the Original Planned Crossing, SPLP performed a desktop analysis of the Original Planned Crossing using the same desktop analysis methodology applied to the Alternative 5 route. The results of this desktop review for the Original Planned Crossing are presented in Table 1b.

Table 1b. Open Cut/HDD Construction Method Impacts on Waterbodies for Original Planned Crossing

Stream Name	Stream ID[1]	Stream Classification[2]	Crossing Method	Stream Impacts Perm (acres)	Stream Impacts Temp (acres)	Floodplain Impacts Perm (acres)	Floodplain Impacts Temp (acres)	Stream Intersection with Original Proposed Route
Serviceberry Run	S-P31	HQ-WWF	Dry Crossing/ Temporary Bridge	0.04	0.05	0.24	0.31	40.436498, -79.454073
Loyalhanna Lake	-	WWF	HDD	0 (1.66)[3]	-	0 (2.36)[3]	-	40.437726, -79.438848
Unnamed Tributary to Loyalhanna Creek (R4SBC)	S-P27	WWF	Dry Crossing	0.02	-	-	-	40.438163, -79.428193
TOTAL				**0.06**	**0.05**	**0.24**	**0.31**	

Notes:
1 Stream identification number identified in Chapter 105 application.
2 Classifications: HQ-WWF – High Quality Warm Water Fishes, WWF – Warm Water Fishes.
3 Use of the HDD construction method avoids direct impacts to streams, therefore impacts are denoted as zero ("0"). Parentheses denote PADEP impact calculations for the area of pipeline installed beneath the stream and floodplain.

The Original Planned Crossing centerline route and permitted workspace cross a total of three (3) NWI/NHD mapped waterbodies. The Original Planned Crossing centerline route and workspace do not cross any freshwater wetland features, including emergent, scrub-shrub, or forested wetlands, mapped in the NWI. Table 1b presents the stream crossings and associated impact analysis.

As permitted by the Department, two (2) streams would be crossed via conventional open cut, dry crossing, construction methods, whereas Loyalhanna Lake would be crossed using the HDD construction method. Under this framework, the Original Planned Crossing would involve direct surface impact to approximately 0.11 acre of stream (bed and banks) and 0.55 acre of associated FEMA-mapped floodplains. The nature of the direct surface impacts to the two (2) streams crossed by conventional open cut construction methods would be similar to the nature of the impacts to the six (6) streams crossed by conventional open cut construction methods on Alternative 5, as described above. Use of the HDD construction method for the 16-inch-diameter pipeline crossing of Loyalhanna Lake avoids direct surface impacts to this waterbody.

While use of the HDD construction method for the 16-inch-diameter pipeline crossing of Loyalhanna Lake avoids direct surface impacts to this waterbody, the construction method possesses an inherent risk of inadvertent return (IR) of drilling fluids to the bed of Loyalhanna Lake, as was experienced during installation of the 20-inch-diameter pipeline crossing. However, SPLP's reevaluation and revised design of the 16-inch-diameter pipeline HDD plan reduces the potential for such an IR to occur. In the unlikely event of an IR, SPLP would implement the measures of its HDD Inadvertent Return Assessment, Preparedness, Prevention and Contingency Plan to avoid, minimize, and mitigate the potential impacts of an IR to a level that is temporary and minor.

In addition, any impacts on the bed and aquatic environment of Loyalhanna Lake associated with an IR that occurs during implementation of the 16-inch-diameter HDD are likely to be temporary and minor, and therefore do not affect the impact analysis presented in Table 1b. Construction of the 20-inch-diameter HDD under Loyalhanna Lake resulted in IRs of drilling fluid (a mixture of water and bentonite clay, a natural material) being released to areas adjacent to the lake and within the lake. As a result, a Consent Order and Agreement (COA) was signed between SPLP and the Department, which required, among other items, corrective measures to evaluate the extent of bentonite clay and water as well as drilling cuttings of the subsoils (IR Materials) on the bottom of the lake. SPLP was required to provide an assessment of the presence of IR Materials on the lake bottom within a COA defined "Assessment Area" and sediment coring inside a defined "Area of Potential Impact".

As summarized with the December 15, 2017 COA, approximately 204 gallons of drilling fluid was estimated to be discharged to the lake. The results of the initial evaluation (remote camera and core sampling) indicated that if any bentonite was deposited on the bottom of Loyalhanna Lake it was limited to single positive sample point. That sample point and surrounding area was further investigated by dive survey that did not observe any sediment anomalies in texture or color at the single sample point or within the 0.35-acre survey area establish around the single sample point.

Given the results of the Initial Evaluation and Additional Investigation reported in the *Mariner East II, Pennsylvania Pipeline Project, Loyalhanna Lake Recreation Area, Final Evaluation Report* dated January 23, 2019, it was determined that bentonite accumulation on or in the lakebed of Loyalhanna Lake is absent or present at a very insignificant quantity. Although any discharge is not desirable, it was noted that given the size of the lake, this is not a significant quantity of material. In addition, given drilling fluid consists of natural materials (water and bentonite clay), any discharge would have no toxic effects on the aquatic environment. Based on these findings, the report concluded that there have been no permanent adverse impacts to Loyalhanna Lake from the relatively insignificant discharge of drilling fluid to the lake, and a plan and schedule for the removal of IR Materials from the lake and lake bed is therefore not necessary. Accordingly, the risk of an IR associated with the use of HDD construction methodologies at the Original Planned Crossing does not affect the impact analysis presented in Table 1b.

Affected Streams Comparative Analysis and Conclusions

Based on this analysis, both the Alternative 5 and Original Planned Crossing would result in temporary and minor direct surface impacts via use of conventional open cut, dry crossing, construction methods. However, Alternative 5 would result in greater direct impacts (six [6] streams totaling approximately 0.47 acre of stream bed and banks and 0.25 acre of associated FEMA-mapped floodplains) than the Original

Planned Crossing (two [2] streams totaling approximately 0.11 acre of stream bed and banks and 0.55 acre of associated FEMA-mapped floodplains). The Original Planned Crossing use of the HDD construction method also would avoid direct surface impacts to Loyalhanna Lake, and in the unlikely event of an IR also would result in only temporary and minor impacts on the lake bed and aquatic environment. Moreover, because Alternative 5 would be a greenfield route, impacts to streams would be new and would increase project-wide cumulative impacts on streams, whereas stream impacts along the Original Planned Crossing would follow the existing and previously disturbed PPP route. Based on the results of this analysis, use of the Original Planned Crossing would result in reduced direct impacts on streams compared to the Alternative 5, and therefore is the preferred alternative.

3. Discuss the slope mitigation measures that would be employed to address the portion of the valley on the east side of the valley with an 85% slope.

Alternative 5 crosses Loyalhanna Creek just north of the Loyalhanna Lake (reservoir) dam. The valley west of the creek has an average slope of approximately 31 percent (17.2°) and the valley east of the creek has a slope of approximately 42 percent (22.7°). Immediately east of the creek valley, a bluff exists with an average slope of 85 percent (40.4°); however, steeper portions may exist. The Alternative 5 pipeline would be installed uphill and perpendicular to contours.

According to the United States Department of Agriculture's Web Soil Survey of this area, the bluff is mapped as the soil unit Gilpin-Rock outcrop complex, 45 to 100 percent slopes (GoF). This soil unit has a high Soil Slippage Potential if vegetation is removed. This soil unit is also described as having shallow depth to bedrock, with typical depths of 30 to 35 inches. Depending on the bedrock hardness, excavation of the pipeline trench to achieve proper depth of cover over the pipeline may require mechanical means or blasting of this shallow bedrock.

Once cleared of vegetation and graded to establish a safe workspace on the bluff, a slope of this steepness may not be able to be restored to original contours and conditions due to the slope angle, such that alternative site restoration measures may be needed.

Prior to selection of any slope mitigation measures, a site-specific investigation of the slope would be necessary to assess ground conditions, geology, slip potential, and slope stability, as well as to design possible mitigation measures.

A detailed, site-specific, slope mitigation plan would be required, including evaluation of measures to mitigate the potential for slips or landslides at this bluff in close proximity to Loyalhanna Creek. Such mitigation measures may include, but not necessarily be limited to:

- Burying the pipeline below the top of rock to protect it in the event of a soil slip.
- Specialized backfill reinforcement.
- Specialized revetment where slope is disturbed.
- Increased frequency of best management practices, such as earthen and/or manufactured water bars; triple stacked compost filter sock, and silt fencing at sediment sump locations.
- Alternative seed mixture or erosion control measures, such as erosion control blankets and/or turf reinforcement mats.

4. Discuss the feasibility of utilizing trenchless technologies to cross Loyalhanna Creek at the location of Alternative Crossing 5.

Alternative Trenchless Construction Methods

SPLP considered and evaluated the feasibility of using trenchless technologies to cross Loyalhanna Creek at the location of the revised Alternative 5 alignment, including conventional auger bore, direct pipe bore, FlexBor, and HDD, as presented below.

Conventional Auger Bore (CAB) Alternative

Use of the **conventional auger bore (CAB) construction method** for the approximately 164-foot-long bank to bank crossing of Loyalhanna Creek, via a minimum CAB length of 240 feet (which assumes the ability to proceed adding less than the typical minimum 50-foot-wide buffer to the creek), **is not technically feasible** due to the limitations of this construction technology, 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.

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. However, based on experience gained during construction of the PPP, CABs should be limited to approximately 200 linear feet at a time, or less, varying by the underlying substrate. CABs 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, and present a risk of failure.

Based on the presence of topographic constraints due to steep slopes on both sides of the creek, the minimum length of a potential CAB construction method crossing of Loyalhanna Creek at Alternative 5 is approximately 240 feet. This length includes the approximately 164-foot bank to bank width of the creek, and approval of a buffer to the creek that is less than the required minimum 50 feet. Given use of the CAB construction method is technically limited to less than 200 linear feet at a time (and may be less depending upon the underlying substrate), it is not technically feasible to employ this type of installation method at the Alternative 5 crossing location of Loyalhanna Creek.

Additionally, based on existing steep topography on both sides of Loyalhanna Creek and use of the minimum approximately 240-foot-long CAB length, the depths of bore pits would need to be approximately 35 feet on the west side of the creek and 68 feet on the east side of the creek to accommodate installation of the pipeline a minimum of 5 feet below the bed of Loyalhanna Creek. Bore pits of these depths are not technically feasible due to the excessive excavation of spoil, large area required for spoil stockpiling on steep slopes, and shoring required to establish and maintain the integrity of the bore pits for the lengthy duration of the CAB construction method. Bore pits of these depths also present significant safety concerns for construction equipment, materials, and personnel, as pit walls would require extensive shoring and diligent monitoring to prevent failure or collapse during the lengthy boring process. In addition, the bore pits would be located less than 50 feet from the bed and banks of Loyalhanna Creek, and therefore have the potential to encounter the groundwater table and experience flooding, resulting is significant safety concerns for construction equipment, materials, and personnel. Therefore, use of the CAB construction method is not technically feasible with regard to safety of construction equipment, materials, and personnel at this location.

Based on the results of this reevaluation, use of the CAB construction method to cross Loyalhanna Creek at Alternative 5 is not technically feasible.

Direct Pipe Bore Alternative

Use of the **direct pipe bore construction method** for the approximately 164-foot-long bank to bank crossing of Loyalhanna Creek, via a minimum direct pipe bore length of approximately 264 feet adding the typical minimum 50-foot-wide buffer to the creek, **is not technically feasible** due to the limitations of this construction technology, as discussed below.

The direct pipe bore construction method, also known as "microtunneling," is a semi-steerable, remote-controlled, continuously supported pipe jacking method. During a 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 through drilling fluid injection out the cutting tool face during rotation, and the cuttings are forced into inlet holes in the cutting 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 returns, and operating controls are enclosed inside the bore casing being installed. At the launching point/entry pit, the bore pipe is held within a "jacking block" that hydraulically pushes the casing forward as the cutting tool cuts the pathway. The cutting tool is marginally larger than the diameter of the casing pipe, and as a result there is minimal annulus space, which minimizes the potential for drilling fluid returns or groundwater returning to the entry pit. Once the bore pipe is successfully installed across the planned length of the bore, the product pipe is pushed through the casing and then tied into the conventionally installed pipeline outside the bored area. The product pipeline has spacers installed around the pipe wall prior to installation to isolate the product pipe from the casing pipe such that no cathodic protection problems result, as the casing pipe remains permanently in place following the completion of the crossing.

The high confidence of success length for a direct bore in any type of subsurface condition is 750 feet in length. Varying by geologic or soil conditions, longer bores are possible. The bank to bank length across Loyalhanna Creek at Alternative 5 is approximately 164 feet. Adding the minimum 50-foot-wide buffer to the creek would result in a minimum direct pipe bore length of approximately 264 feet. SPLP's construction

contractors have successfully completed one (1) direct pipe bore approximately 925 feet in length on the PPP. While the length of a direct pipe bore across Loyalhanna Creek at Alternative 5 would be within this window, it should be noted that the 925-foot direct pipe bore was setup within a relatively flat area immediately outside the river floodplain and bored under the floodplain, wetlands, and river, exiting at the toe of a mountain slope. A separate attempt at a direct pipe bore failed at a different location (Piney Creek) with more variable topography. Accordingly, the likelihood of a successful direct pipe bore at Loyalhanna Creek is uncertain

Moreover, based on existing steep topography on both sides of Loyalhanna Creek and use of the minimum approximately 264-foot-long direct pipe bore length, the depths of bore pits would be at least 35 feet on the west side of the creek and 68 feet on the east side of the creek to accommodate installation of the pipeline a minimum of 5 feet below the bed of Loyalhanna Creek. As noted previously, bore pits of these depths are not technically feasible due to the excessive excavation of spoil, large area required for spoil stockpiling on steep slopes, and shoring required to establish and maintain the integrity of the bore pits for the lengthy duration of the direct pipe bore construction method. Bore pits of these depths also present significant safety concerns for construction equipment, materials, and personnel, as pit walls would require extensive shoring and diligent monitoring to prevent failure or collapse during the lengthy boring process. In addition, although the bore pits would be located 50 feet from the bed and banks of Loyalhanna Creek, the bore pits would have the potential to encounter the groundwater table and experience flooding, resulting is significant safety concerns for construction equipment, materials, and personnel. Therefore, use of the direct pipe bore construction method is not technically feasible with regard to safety of construction equipment, materials, and personnel at this location.

Based on the results of this reevaluation, use of the direct pipe bore construction method to cross Loyalhanna Creek at Alternative 5 is not technically feasible.

FlexBor Alternative

Use of the **FlexBor construction method** for the approximately 164-foot-long bank to bank crossing of Loyalhanna Creek, via a minimum FlexBor length of approximately 264 feet adding the minimum 50-foot-wide buffer to the creek, **is not technically feasible** due to the limitations of this construction 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 is 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 inadvertent return. Cuttings in the pilot phase return along the 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, inadvertent return potential during the ream is substantially reduced. A FlexBor can be employed using a small hydraulic powered unit or converted standard HDD unit.

SPLP contractors attempted three (3) FlexBors and partially completed two of these to replace HDDs on the PPP. 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.

Additionally, based on existing steep topography on both sides of Loyalhanna Creek and use of the minimum approximately 264-foot-long FlexBor length, the depths of bore pits (although potentially shallower than for the CAB and direct pipe bore methods) would still not be technically feasible for the same reasons described above. Therefore, use of the FlexBor construction method is not technically feasible with regard to safety of construction equipment, materials, and personnel at this location.

Based on the results of this reevaluation, use of the FlexBor construction method to cross Loyalhanna Creek at Alternative 5 is not technically feasible.

Horizontal Directional Drill (HDD)

Use of the **HDD construction method** for the approximately 164-foot-long bank to bank crossing of Loyalhanna Creek, via a site-specific designed HDD plan, **is not technically feasible** due to the limitations of this construction technology, as discussed below.

As noted above, as part of SPLP's evaluation of Alternative 5, SPLP performed a more detailed desktop review of the originally-developed Alternative 5 routing alignment presented in SPLP's letter to the Department dated April 11, 2019. As a result of this review, SPLP developed a revised alignment for Alternative 5 that avoids crossing USACE property, Bush Recreation Area, and Loyalhanna Lake. Using this revised alignment, SPLP developed a site-specific HDD construction method plan for the approximately 164-foot-long bank to bank crossing of Loyalhanna Creek. A plan and profile drawing depicting this HDD plan is provided in Exhibit 4.

The subject HDD is aligned with surface topography to accommodate entry and exit workspaces on relatively level terrain, allow a reasonable HDD profile (or pipe radius), and ensure adequate pipe depth (152 feet) below the bed of Loyalhanna Creek to minimize the potential for an inadvertent return of drilling fluids to the creek. The HDD is 3,734 feet in length, and would avoid surface disturbances to Loyalhanna Dam Road, Loyalhanna Creek, and a buried natural gas pipeline. Due to the HDD exit workspace being located at a point of inflection in the revised Alternative 5 alignment, the HDD pullback string workspace would not be aligned with the pipeline right-of-way and thereby would require an approximately 3,700-foot-long temporary workspace located to the west of the HDD exit, which in turn would require substantial clearing of primarily forested land.

However, use of the subject HDD plan is not technically feasible due to the presence and HDD profile intersection of two existing and extensive subsurface (deep mining) coal mines, as depicted in Exhibit 5. Specifically, as depicted in Exhibit 4, the HDD profile intersects the existing Keystone Coal Company's Moween Mine on the east side of Loyalhanna Creek (at approximately 480 feet along the HDD profile and west of the HDD entry) at a depth of approximately 100 feet below ground surface. Also as depicted in Exhibit 4, the HDD profile intersects the existing Seanor Coal Company's Loyal Mine on the west side of Loyalhanna Creek (at approximately 3,079 feet along the HDD profile, and approximately 655 feet east of the HDD exit) at a depth of approximately 100 feet below ground surface; the HDD profile also traverses less than 100 feet below the portal (entrance) of this mine. The HDD profile intersects mined-out intervals of the Upper Freeport Coal seam, meaning the HDD profile would encounter empty space and mine pools

associated with the mined portions of these two deep mines. As the HDD construction method passing through the mines is infeasible without a high probability of significant fluid losses and potential impacts to the mine pool levels, the use of the HDD construction method through these mined intervals is technically infeasible.

Based on the results of this reevaluation, use of the HDD construction method to cross Loyalhanna Creek at Alternative 5 is not technically feasible.

Enhanced Open Cut Alternative Analysis

Scope of Analysis

In addition to a feasibility analysis of the use of trenchless technologies to cross Loyalhanna Creek at the location of the revised Alternative 5 alignment, SPLP performed and herein presents an enhanced alternatives analysis consisting of a direct quantitative and qualitative comparison of the potential impacts to natural, cultural, and human environment resources of the revised Alternative 5 route using the open cut construction method and the Original Planned Crossing using HDD construction methods.

Methodology

For this analysis, SPLP performed a desktop review of publicly-available databases and aerial photography to identify potential resources that would be crossed by the Alternative 5 route and Original Planned Crossing. Specifically, SPLP overlaid publicly-available GIS database layers and aerial photography onto the Alternative 5 route centerline and preliminary workspace and Original Planned Crossing proposed and approve centerline and workspace to identify features crossed and calculate the associated temporary and permanent construction right-of-way impact area on identified features. In addition to NWI, NHD, and FEMA NFHL features discussed in response to question 2 above, SPLP assessed the following features and/or impacts:

- Length (miles) – co-located vs. greenfield, and total;
- Land disturbance (acres) – temporary and permanent construction rights-of-way;
- Newly affected landowners (number);
- Federal land (miles);
- State land (miles);
- Special land uses (miles);
- Threatened and endangered species habitat (miles);
- Cultural resources (miles) – moderate and high cultural resource (CR) probability areas;
- Historic resources (miles);
- Land use cover types (miles) – agriculture, developed, forest, open, interspersed open-scrub shrub-forest, road, and water;
- NWI-mapped features (acres); and
- NHD-mapped features (acres).

The site-specific surveys and data used to calculate stream impacts and presented in the original Chapter 105 application are not available for Alternative 5. Accordingly, to ensure an appropriate comparative analysis, SPLP performed a desktop comparative analysis of Alternative 5 and the Original Planned Crossing using the same desktop analysis methodology.

Results

The results of the desktop review for the revised Alternative 5 route (open cut construction method) and Original Planned Crossing are presented in Table 2 and in a qualitative narrative assessment presented below.

Table 2. Comparative Quantitative Impact Assessment of Alternative 5 and Original Planned Crossing.

Resource	Original Planned Crossing			Alternative 5		
Length (miles)						
Co-located (with existing corridors)	2.88			1.99		
Greenfield	0.00			3.09		
Total	2.88			5.08		
Land Disturbance (acres)	**Temp**	**Perm**	**Total**	**Temp**	**Perm**	**Total**
Total	13.78	17.59	31.37	18.29	30.82	49.11
Newly Affected Landowners (number)	N/A (previously affected)			41		
Federal Land (miles)	0.25[a]			0.00		
State Land (miles)	0.00[b]			0.00[b]		
Special Land Uses (miles)	0.00			0.00		
T&E Species Habitat (miles)[c]	0.83[d]			1.82[d]		
Cultural Resources (CR) (acres)						
Medium CR Probability	12.86			18.88		
High CR Probability	6.53			18.36		
Historic Resources (miles)	0.00			0.00		
Land Use Cover Types (miles)						
Agriculture	0.45			0.45		
Developed	0.10			0.00		
Forest	1.27			3.59		
Open	0.54			0.63		
Open Scrub Shrub Forest	0.00			0.32		
Road	0.28			0.06		
Water	0.24			0.03		
Total	2.88			5.08		
Wetlands/Waterbodies	**Temporary**		**Permanent**	**Temporary**		**Permanent**
Wetlands (NWI) (acres)	0.00		0.00	0.00		0.00
Streams (NWI) (acres) – Open Cut	0.05		0.06	0.11		0.36
Floodplains (acres) – Open Cut	0.31		0.24	0.02		0.23
NHD Area (acres) – Open Cut and HDD	0.50		2.71	0.00		0.17

a United States Army Corps of Engineers land.
b The pipeline crosses Loyalhanna Creek Water Trail.
c These routes are entirely within the rusty patch bumblebee (*Bombus affinis*) range.
d The mileage given represents the route length within a 3-mile buffer of a northern long-eared bat (*Myotis septentrionalis*) capture.

Alternative 5

Route Length and Co-Location – The Alternative 5 route for the 16-inch-diameter pipeline is approximately 5.08 miles in length (see Table 2), of which approximately 1.99 miles would be co-located

with (abut and/or overlap) existing utility rights-of-way or other linear disturbances (roadways) consistent with SPLP's Initial Route Selection criteria (discussed below) for the Original Planned Crossing. However, approximately 3.09 miles of the Alternative 5 route would be greenfield (not co-located with existing linear disturbances), which is inconsistent with SPLP's Initial Route Selection criteria, resource agencies (i.e., Pennsylvania Field Office of the U.S. Fish and Wildlife Service) preferred pipeline routing method, and a key recommendation of Pennsylvania Governor Tom Wolf's Pipeline Infrastructure Task Force Report.

Land Use and Cover Type Disturbance – The Alternative 5 route would disturb a total of approximately 49.1 acres of land, including 18.3 acres in the temporary construction right-of-way which would be allowed to revert to pre-construction conditions and 30.8 acres in the permanent right-of-way which would be restored to pre-construction conditions or (for forested lands) converted to herbaceous vegetation condition. This area of land disturbance is significantly greater (approximately 17.7 acres) than that affected by the Original Planned Crossing, including greater crossing length (approximately 2.32 miles) of forested lands.

Moreover, because Alternative 5 would be a greenfield route, impacts to land would be new and would increase project-wide cumulative impacts on land uses and cover types. As described in Section 5.0 of the original Alternatives Analysis for the project, state and federal guidelines strongly recommend routing new linear projects in co-location with existing utility rights-of-way to the maximum extent practicable. These guidelines recognize that new "greenfield" routing of linear projects has the potential to result or results in increased site-specific and cumulative environmental impacts. These increased impacts may include, but are not necessarily limited to the following:

- increased amount of new, permanent land disturbance and encumbrance on existing industrial and commercial development and associated land uses;
- increased amount of new, permanent land disturbance on existing private residential development, private land uses, and affected private landowners;
- permanent reduction in availability of land for future development;
- inconsistency with county comprehensive plans;
- increased amount of new, permanent land disturbance and landscape fragmentation, including impairment of natural landscapes, scenic uses, recreational uses, contiguous forested lands, and contiguous natural resources;
- increased amount of new, permanent forested land fragmentation, including impairment of forested ecosystem functions and values, watershed/water quality values, and availability of contiguous forest habitat for interior wildlife species and migratory birds protected pursuant to the Migratory Bird Treaty Act;
- permanent reduction in availability of land for future natural resource uses, including natural landscapes, scenic uses, recreational uses, forested lands, forest production, and other natural resources;
- increased potential to effectuate a cumulative impact on land use planning, land fragmentation, forest fragmentation, and natural resource fragmentation.

Landowners and Properties – Based on the analysis presented in response to question 1 above, the Alternative 5 route traverses a total of 60 individual land parcels (tracts) inclusive of 45 individual private landowners (not including public road crossings), of which 56 tracts and 41 individual private landowners would be newly affected by the PPP. Because the majority of Alternative 5 is a greenfield route (not co-located with existing utility or other disturbed corridors) and possesses areas of moderate to high population

density, as stated above it is very likely SPLP would be required to use eminent domain to acquire property easements via condemnation proceedings on a substantial portion of the newly affected landowners, which will likely result in material increased project cost associated with legal proceedings and easement acquisition, and major delays to the project construction and in-service schedule.

Special Land Uses – The Alternative 5 route has been intentionally aligned to avoid traversing USACE property associated with the Loyalhanna Lake Recreation Area, including the Bush Recreation Area. However, this route would cross the Loyalhanna Creek Water Trail via open cut construction method, as depicted on Exhibit 6. No other federal or state lands or special surface land uses are traversed by the Alternative 5 route.

However, the Alternative 5 route traverses more portions of the two existing and extensive subsurface (deep mining) coal mines (Keystone Coal Company's Moween Mine on the east side of Loyalhanna Creek and Seanor Coal Company's Loyal Mine on the west side of Loyalhanna Creek), as depicted in Exhibit 5. In addition, the Alternative 5 route (via open cut construction method) traverses in close proximity (estimated less than 200 feet) to the mine portal (entrance) of the Loyal Mine on the west side of Loyalhanna Creek and north of the construction workspace required for the open trench crossing of Loyalhanna Creek, and in proximity (less than 600 feet at its closest location) to a surface strip mining area on the east side of Loyalhanna Creek and south of the route.

Protected Species – The Alternative 5 route is entirely located within the range of the rusty patch bumblebee (*Bombus affinis*). This route also traverses approximately 1.82 miles of area within a 3-mile buffer zone around a northern long-eared bat (*Myotis septentrionalis*) capture, which is approximately 0.99 mile greater than the Original Planned Crossing. Moreover, the Alternative 5 route has not yet been subject to the Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Process to assess for potential impacts to threatened, endangered, special concern species and special concern resources in Pennsylvania, and therefore would require additional agency consultation, field surveys, technical reports, and clearances to proceed with construction.

Cultural Resources – The Alternative 5 route is not located within one mile of known historic resources listed on the National Register of Historic Places (NRHP). However, this route traverses approximately 18.9 miles of medium (6.0 miles greater than the Original Planned Crossing), and approximately 18.4 miles of high (11.9 miles greater than the Original Planned Crossing), probability areas for the presence of cultural resources. Moreover, the Alternative 5 route has not been reviewed and approved by the Department, inclusive of completion of consultation with the State Historic Preservation Office (SHPO), and therefore would require additional agency consultation, field surveys, technical reports, and clearances to proceed with construction.

Wetlands – As noted in the analysis presented in response to question 2 above, the Alternative 5 route would not cross any NWI- or NHD-mapped wetland features.

Streams and Floodplains – As noted in the analysis presented in response to question 2 above, the Alternative 5 route would result in temporary and minor direct surface impacts to streams (six [6] streams totaling approximately 0.47 acre of stream bed and banks and 0.25 acre of associated FEMA-mapped floodplains) via use of conventional open cut, dry crossing, construction methods, as depicted in Exhibit 7. As a result, the Alternative 5 route would result in a greater number and areal extent of impacts to streams

than the Original Planned Crossing. Moreover, because Alternative 5 would be a greenfield route, impacts to streams would be new and would increase project-wide cumulative impacts on streams and floodplains.

Logistics – Compared to the Original Planned Crossing, the Alternative 5 route would be a new alignment for the PPP that would require additional analysis to develop a final detailed design for, and to permit, the pipeline alignment, workspace, and site- and resource-specific construction plans. This analysis would include, but not be limited to: affected landowner consultation and acquisition of survey permissions and construction easements; in-field engineering, civil, and environmental surveys; development of detailed design and erosion and sediment control plans; development of detailed site-specific slope mitigation measures; and agency consultation and development of detailed applications for federal, state, and local permits and associated best management practice and impact avoidance, minimization, and mitigation plans. Being longer (2.2 miles) with significant greenfield conditions (3.09 miles not co-located with existing linear disturbances) compared to the Original Planned Crossing, the development, analysis, and permitting of the Alternative 5 route would require substantial time and cost, and result in further major delays to the project construction and in-service schedule.

Summary Conclusions for Alternative 5 Route – Based on the results of this enhanced alternatives analysis, the revised Alternative 5 route with use of the open cut construction method:

1) may be a technically feasible alternative;
2) may be a practicable alternative taking into consideration cost, existing technology, and logistics;
3) results in impacts, including likely condemnation proceedings, to a significant number of newly affected landowners and parcels;
4) avoids crossing special land use areas associated with USACE property and Loyalhanna Lake,
5) crosses more area associated with subsurface mines and associated mine pools, and located near a mine portal and surface strip mine;
6) results in substantially greater impacts to environmental resources (land disturbance, land use cover types, forested land, protected species areas, cultural resource medium and high probability areas, streams) compared to the Original Planned Crossing, and
7) moreover, being primarily a greenfield route requiring detailed development, design (including steep slope mitigation), analysis, and permitting, results in substantial additional cost and further delay to the project construction and in-service schedule.

For the foregoing reasons, the Alternative 5 route is not the preferred or selected alternative for this crossing location.

Original Planned Crossing

Route Length and Co-Location – The Original Planned Route for the 16-inch-diameter pipeline is approximately 2.88 miles in length (see Table 2) and parallels, and entirely overlaps the construction workspace of, the previously installed 20-inch-diameter pipeline as part of the PPP. As described in Section 3.2 of the original Alternatives Analysis for the project, SPLP originally designed the alignment to be co-located with (abut and/or overlap) the right-of-way of the existing Mariner East 1 Pipeline in accordance with the PPP's Initial Route Selection criteria. Co-location was adopted as a major means to avoid environmental impacts and impacts to sensitive resources and communities, and to minimize the site-specific and cumulative environmental impacts arising from the project. Sharing existing utility right-of-way corridors also was identified by resource agencies (i.e., Pennsylvania Field Office of the U.S. Fish and

Wildlife Service) as a preferred pipeline routing method and was a key recommendation of Pennsylvania Governor Tom Wolf's Pipeline Infrastructure Task Force Report.

Land Use and Cover Type Disturbance – The Original Planned Crossing would disturb a total of approximately 31.4 acres of land, including 13.8 acres in the temporary construction right-of-way which would be allowed to revert to pre-construction conditions and 17.6 acres in the permanent right-of-way which would be restored to pre-construction conditions or (for forested lands) converted to herbaceous vegetation condition. This area of land disturbance is significantly less (approximately 17.7 acres) than that affected by the Alternative 5 route, including less crossing length (approximately 2.32 miles) of forested lands. Moreover, because the Original Planned Crossing would follow the existing PPP route, impacts to land use would be entirely within previously disturbed workspace and would not increase project-wide cumulative impacts on land use (see Alternative 5 description of project-wide cumulative impacts above).

Landowners and Properties –The Original Planned Crossing route for the 16-inch-diameter pipeline parallels, and entirely overlaps the construction workspace of, the previously installed 20-inch-diameter pipeline as part of the PPP, and therefore would not affect any new landowners or properties. As a result, use of the Original Planned Crossing route for the 16-inch-diameter pipeline would avoid the likely requirement for SPLP to use eminent domain to acquire property easements via condemnation proceedings on a substantial portion of the newly affected landowners on the Alternative 5 route, which in turn avoids significant logistical, cost, and schedule issues (see response to question 1).

Special Land Uses – The Original Planned Crossing traverses approximately 0.25 mile of USACE property associated with the Loyalhanna Lake Recreation Area, including close proximity to the Bush Recreation Area, as depicted on Exhibit 6. This route also crosses the Loyalhanna Creek Water Trail, as depicted on Exhibit 6. However, the majority of this crossing avoids direct impacts to the USACE property and associated recreational uses, as well as the Loyalhanna Creek Water Trail, via use of the HDD construction method, and the USACE has reviewed and approved the entirety of the crossing and construction plans, including completion of the associated National Environmental Policy Act process. No other federal or state lands or special surface land uses are traversed by the Original Planned Crossing.

As part of SPLP's *Horizontal Directional Drill Analysis, Loyalhanna Lake Crossing, PADEP Section 105 Permit No.: E65-973, PA-WM2-0064.0000-WX-16, (SPLP HDD No. S2-0010)*, SPLP has intentionally revised the 16-inch-diameter HDD profile to be longer, deeper into bedrock, and deeper beneath Loyalhanna Lake and the eastern shoreline than the original profile, representing a reduced risk of creating one or more IRs, similar to those that occurred during installation of the 20-inch-diameter pipeline. As part of this revised design, the 16-inch-diameter HDD profile has a subsurface intersection of the mined-intervals of one existing and extensive subsurface (deep mining) coal mine (Seanor Coal Company's Loyal Mine on the west side of Loyalhanna Lake), as depicted in Exhibit 5. In addition, SPLP performed an extensive, site-specific *Coal Mine Subsidence and Stress Analysis* for the revised 16-inch-diameter HDD profile located above this subsurface mine, inclusive of recommendations for best management practices during HDD construction. Based on the results of SPLP's reevaluation analyses, SPLP has determined that the revised HDD plan in proximity to this subsurface mine area is technically feasible.

Protected Species – The Original Planned Crossing is entirely located within the range of the rusty patch bumblebee (*Bombus affinis*). This route also traverses approximately 0.83 mile of area within a 3-mile

buffer zone around a northern long-eared bat (*Myotis septentrionalis*) capture, which is approximately 0.99 mile less than the Alternative 5 route. Moreover, the Original Planned Crossing has been reviewed and approved by the Department, inclusive of completion of the PNDI Environmental Review Process for potential impacts to threatened, endangered, special concern species and special concern resources in Pennsylvania, and therefore would not require any additional agency consultation, field surveys, technical reports, or clearances to proceed with construction.

Cultural Resources – The Original Planned Crossing is not located within 1.0 mile of known historic resources listed on the NRHP. However, this route traverses approximately 12.9 miles of medium (6.0 miles less than the Alternative 5 route), and approximately 6.5 miles of high (11.9 miles less than the Alternative 5 route), probability areas for the presence of cultural resources. Moreover, the Original Planned Crossing has been reviewed and approved by the Department, inclusive of completion of consultation with the SHPO, and therefore would not require any additional agency consultation, field surveys, technical reports, or clearances to proceed with construction.

Wetlands – As noted in the analysis presented in response to question 2 above, the Original Planned Crossing would not cross any NWI- or NHD-mapped wetland features.

Streams and Floodplains – As noted in the analysis presented in response to question 2 above, the Original Planned Crossing would result in temporary and minor direct surface impacts to streams (two [2] streams totaling approximately 0.11 acre of stream bed and banks and 0.55 acre of associated FEMA-mapped floodplains) via use of conventional open cut, dry crossing, construction methods, as depicted in Exhibit 7. In addition, the Original Planned Crossing would use the HDD construction method to avoid direct surface impacts to Loyalhanna Lake, and in the unlikely event of an IR, would likely result in temporary and minor impacts on the lake bed and aquatic environment. As a result, the Original Planned Crossing would result in a reduced number and areal extent of impacts to streams than the Alternative 5 route. Moreover, because the Original Planned Crossing would follow the existing PPP route, impacts to streams would be entirely within previously disturbed workspace and would not increase project-wide cumulative impacts on streams and floodplains.

Logistics – Compared to the Alternative 5 route, the Original Planned Crossing for the 16-inch-diameter pipeline parallels, and entirely overlaps the construction workspace of, the previously installed 20-inch-diameter pipeline as part of the PPP. The Original Planned Crossing has already been developed, designed, analyzed, and permitted by the Department, USACE, and other federal, state, and local agencies, and therefore may proceed with construction immediately upon Department acceptance of SPLP's HDD reevaluation and supplemental information. The Original Planned Crossing avoids the substantial logistical challenges associated with Alternative 5, including, but not be limited to: affected landowner consultation and acquisition of survey permissions and construction easements; in-field engineering, civil, and environmental surveys; development of detailed design and erosion and sediment control plans; development of detailed site-specific slope mitigation measures; and agency consultation and development of detailed applications for federal, state, and local permits and associated best management practice and impact avoidance, minimization, and mitigation plans. Being significantly shorter (2.2 miles) with no greenfield conditions, as compared to the Alternative 5 route, the Original Planned Crossing avoids substantial increases in project cost and further delay to the project construction and in-service schedule.

Summary Conclusions for Original Planned Crossing – Based on the results of this enhanced alternatives analysis, the Original Planned Crossing including use of the HDD construction method across Loyalhanna Lake:

1) is a technically feasible alternative;
2) is a practicable alternative taking into consideration cost, existing technology, and logistics;
3) avoids impacts to newly affected landowners and parcels, including condemnation proceedings;
4) avoids direct impacts to special land use areas associated with USACE property and Loyalhanna Lake via use of the HDD construction method,
5) crosses less area associated with subsurface and surface mines;
6) results in significantly less impacts to environmental resources (land disturbance, land use cover types, forested land, protected species areas, cultural resource medium and high probability areas, streams) as compared to the Alternative 5 route, and
7) moreover, being an existing route that parallels, and entirely overlaps the construction workspace of, the previously installed 20-inch-diameter pipeline as part of the PPP, avoids substantial increases in project cost and further delay to the project construction and in-service schedule.

Although the Original Planned Crossing possesses a risk of potential IRs in one or more locations, SPLP's revised 16-inch-diameter pipeline HDD profile and best management recommendations incorporates substantial site-specific analysis that reduces this risk. Therefore, the Original Planned Crossing with revised 16-inch-diameter HDD plan is the preferred and selected alternative for this crossing location.

Conclusions

Based on this enhanced alternative analysis, both the Original Planned Crossing (with revised 16-inch-diameter HDD plan and recommendations) and Alternative 5 (dependent upon final development, design, permissions, and permits) are considered **technically feasible and practicable with regard to cost, existing technology, and logistics**. At the desktop level of analysis, neither alternative impacts NWI-mapped wetlands. However, Alternative 5 results in significantly more quantitative and qualitative impacts to newly affected landowners and other (non-wetland) environmental resources, and therefore was not selected as the preferred or proposed alternative. Conversely, the Original Planned Crossing results in significantly less quantitative and qualitative impacts to landowners and other (non-wetland) environmental resources, was selected as the preferred and proposed alternative, and was previously approved by the Department under Chapter 105 Permit No. E65-973 on February 13, 2017. The results of this enhanced alternatives analysis therefore confirm the conclusions in the original application (approved February 13, 2017) and supplemental filing (April 11, 2019) that the Original Planned Crossing is the preferred and most practicable alternative with regard to cost, existing technology, and logistics.

SPLP submits that we have been, and are, in complete compliance with the agreed terms and requirements of analysis of the Order, as agreed to by the Department, and that no further analysis is required for the Department to consent to the start of this HDD. SPLP therefore requests that the Department approve the Reevaluation Report for Loyalhanna Lake Crossing Horizontal Directional Drill (S2-0010) as soon as possible.

Sincerely,

Larry J. Gremminger, CWB
Vice-President – Environmental, Health & Safety
Energy Transfer Partners
Mariner East 2 Pipeline Project

Attachment as stated.

EXHIBIT 1

List of Landowners and Parcels Potentially Affected by Alternative 5, Westmoreland County, PA

Exhibit 1. List of Landowners and Parcels Potentially Affected by Alternative 5, Westmoreland County, PA.

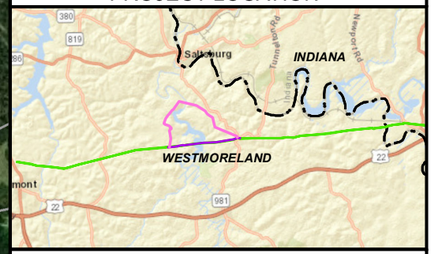
GISTract	Encroach	PARCEL_ID	Last	First	CorpTrust	Add1	City	ST	Zip	ZipPlus	LglCounty	LglState
PA-WM2-0060.0005-RD	Martz Rd							PA			Westmoreland	Pennsylvania
PA-WM2-0060.0016-RD	Loyalhanna Dam Rd							PA			Westmoreland	Pennsylvania
PA-WM2-0060.0029-RD	Loyalhanna Dam Rd							PA			Westmoreland	Pennsylvania
PA-WM2-0060.0030-WX	Loyalhanna Reservoir							PA			Westmoreland	Pennsylvania
PA-WM2-0060.0032-RD	Old Cemetery Rd							PA			Westmoreland	Pennsylvania
PA-WM2-0060.0041-RD	Bush Rd							PA			Westmoreland	Pennsylvania
PA-WM2-069.0000-RD	Orangewood Dr							PA			Westmoreland	Pennsylvania

[redacted] online tracts

EXHIBIT 2

Land Parcels Traversed by, and Private Water Wells (PaGWIS) Located within 450 feet of, Alternative 5, Westmoreland County, PA

PROJECT LOCATION



Legend

- Alternative 5 Route
- Proposed/Permitted Route
- Original Proposed Route (ME1)
- Parcels Crossed by Alternative 5 Route
- Parcels Not Crossed by Alternative 5 Route
- Private Water Wells
- Private Water Well 450-foot Buffer

0 612.5 1,225 Feet

N

Exhibit 2. Land Parcels Traversed by, and Private Water Wells (PaGWIS) Located within 450 Feet of, Alternative 5, Westmoreland County, PA

Prepared By:

TETRA TECH

Date:

09/2019

Base Map;
ESRI World Imagery, 4/2014-5/2015

Coordinate System: WGS 84

P:\GIS\projects\112C05958-PPP\MXD\Major\Alternative\Exhibit2_PrivateWaterWells.mxd JL

EXHIBIT 3

Public Water Supplies (Groundwater Wells) Located within 1 mile of Alternative 5, Westmoreland County, PA

Exhibit 3. Public Water Supplies (Groundwater Wells) Located within 1 mile of Alternative 5, Westmoreland County, PA.

PWS_ID	SYSTEM_NAME	AREA_CITY	RESPONSIBLE_OFFICIER	PHONE	ACTIVITY[1]	ID
5650813	WOODS CLUB OF LOYALHANNA TWP	LOYALHANNA TWP	[redacted]	[redacted]	I	138120
5650067	COUNTRY VILLAGE MHP	LOYALHANNA TWP	[redacted]	[redacted]	I	137982
5650894	DIS ICE CREAM	LOYALHANNA TWP	[redacted]	[redacted]	I	138151
5650026	PINE GARDEN APARTMENTS	LOYALHANNA TWP	[redacted]	[redacted]	A	137973
5650026	PINE GARDEN APARTMENTS	LOYALHANNA TWP	[redacted]	[redacted]	A	137972
5650903	LOYALHANNA DAM	LOYALHANNA TWP	[redacted]	[redacted]	A	146696
5650813	WOODS CLUB OF LOYALHANNA TWP	LOYALHANNA TWP	[redacted]	[redacted]	I	138121
5650026	PINE GARDEN APARTMENTS	LOYALHANNA TWP	[redacted]	[redacted]	A	137975
5650902	BUSH RECREATION AREA	LOYALHANNA TWP	[redacted]	[redacted]	A	138153
5650346	WOODLAND LOUNGE	LOYALHANNA TWP	[redacted]	[redacted]	I	138011
5650067	COUNTRY VILLAGE MHP	LOYALHANNA TWP	[redacted]	[redacted]	I	137983
5650026	PINE GARDEN APARTMENTS	LOYALHANNA TWP	[redacted]	[redacted]	A	137974
5650903	LOYALHANNA DAM	LOYALHANNA TWP	[redacted]	[redacted]	A	138154
5650312	MARSHALLS MARKET	LOYALHANNA TWP	[redacted]	[redacted]	A	137999

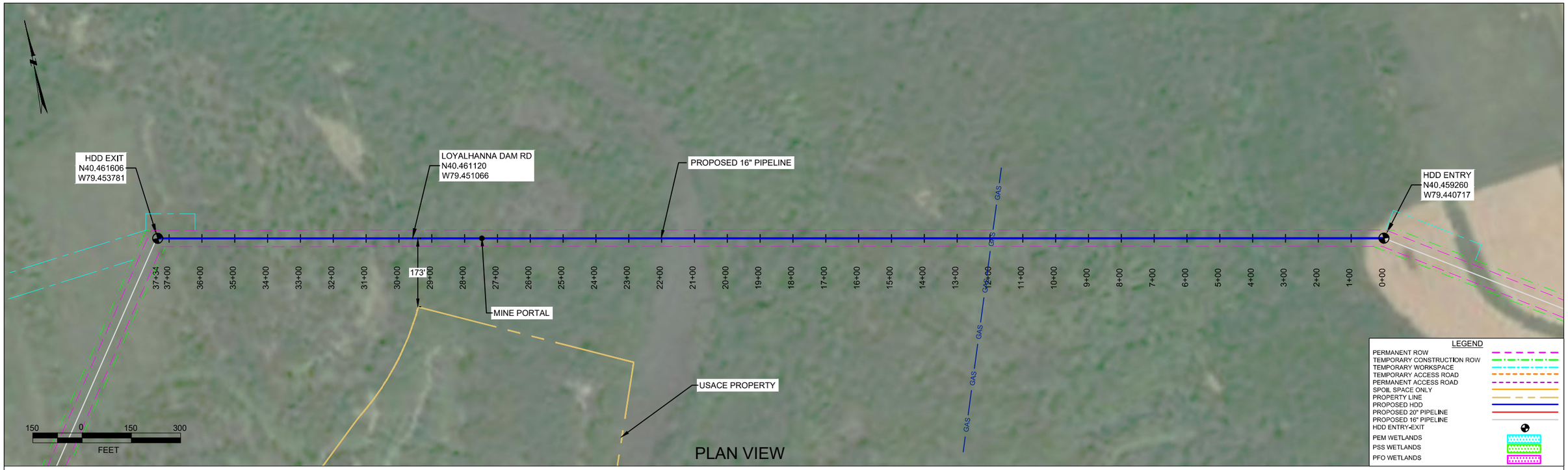
Notes:

1 A = Active, I = Inactive

2 Source: eMapPA online software, accessed August 26, 2019.

EXHIBIT 4

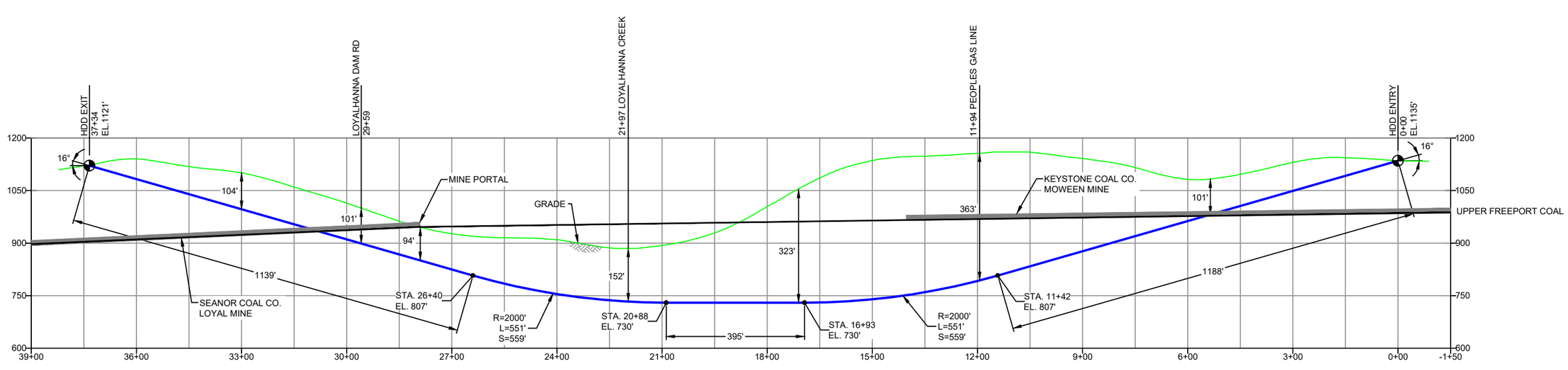
Horizontal Directional Drill (Plan and Profile Drawing) Loyalhanna Lake Alternative 5



PLAN VIEW

WESTMORELAND COUNTY, PENNSYLVANIA - LOYALHANNA TOWNSHIP

PROFILE VIEW



DESIGN AND CONSTRUCTION:

1. CONTRACTOR SHALL FIELD VERIFY DEPTH OF ALL EXISTING UTILITIES SHOWN OR NOT SHOWN ON THIS DRAWING.
2. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FEET AS MEASURED FROM THE OUTSIDE EDGE OF THE UTILITY TO OUTSIDE OF PROPOSED PIPELINE.
3. DESIGNED IN ACCORDANCE WITH CFR 49 195 & ASME B31.4
4. CROSSING PIPE SPECIFICATION:
   HDD HORZ. LENGTH (L=):3734'
   HDD PIPE LENGTH (S=):3839'
   16" x 0.438" W.T., X-70, APISL, PSL2, ERW, BFW
   COATING: 14-16 MILS FBE WITH 30-35 MIL ARO (POWERCRETE OR ENGINEER APPROVED EQUAL)
5. INTERNAL DESIGN PRESSURE 2100 PSIG (SEAM FACTOR 1.0, DESIGH FACTOR 0.50).
6. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL (HDD).
7. PIPELINE WARNING MARKERS SHALL BE INSTALLED ON BOTH SIDES OF ALL ROAD, RAILWAY, AND STREAM CROSSINGS.
8. CARRIER PIPE NOT ENCASED.
9. PIPE / AMBIENT TEMPERATURE MUST BE NO LESS THAN 30°F DURING PULLBACK WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENGINEER.
10. CONDUCT 4-HOUR PRE-INSTALLATION HYDROTEST OF HDD PIPE STRING TO MINIMUM 2625 PSIG.
11. SEE SUNOCO PENNSYLVANIA PIPELINE PROJECT ESRI WEBMAP FOR ACCESS ROAD ALIGNMENT.

FOR REVIEW ONLY

NOTES

1. ALL COORDINATES SHOWN ARE IN LATITUDE AND LONGITUDE. ALL MSL ELEVATIONS ARE NAD83
2. STATIONING IS BASED ON HORIZONTAL DISTANCES.
3. ROONEY ENGINEERING, INC. AND SUNOCO PIPELINE, LP ARE NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES SHOWN IN PLOT PLAN OR PROFILE. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF ROONEY ENGINEERING, INC. AND SUNOCO PIPELINE, LP, FOR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
4. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES. CONTACT ONE CALL AT 811 PRIOR TO DIGGING.
5. SUNOCO EMERGENCY HOTLINE NUMBER IS #1-800-786-7440.

REF. DRAWING

DWG NO		DWG NO	DESCRIPTION
X	TO	X	EROSION & SEDIMENT PLAN
X	TO	X	AERIAL SITE PLAN

REVISIONS

NO.	DESCRIPTION	BY	DATE	CHK	DATE	APP	DATE
A	ISSUED FOR REVIEW	MRS	08/23/19	RMB	08/23/19	CAG	08/23/19

Sunoco Logistics Partners L.P.

TETRA TECH ROONEY
(303) 792-5911

SUNOCO PIPELINE, L.P.

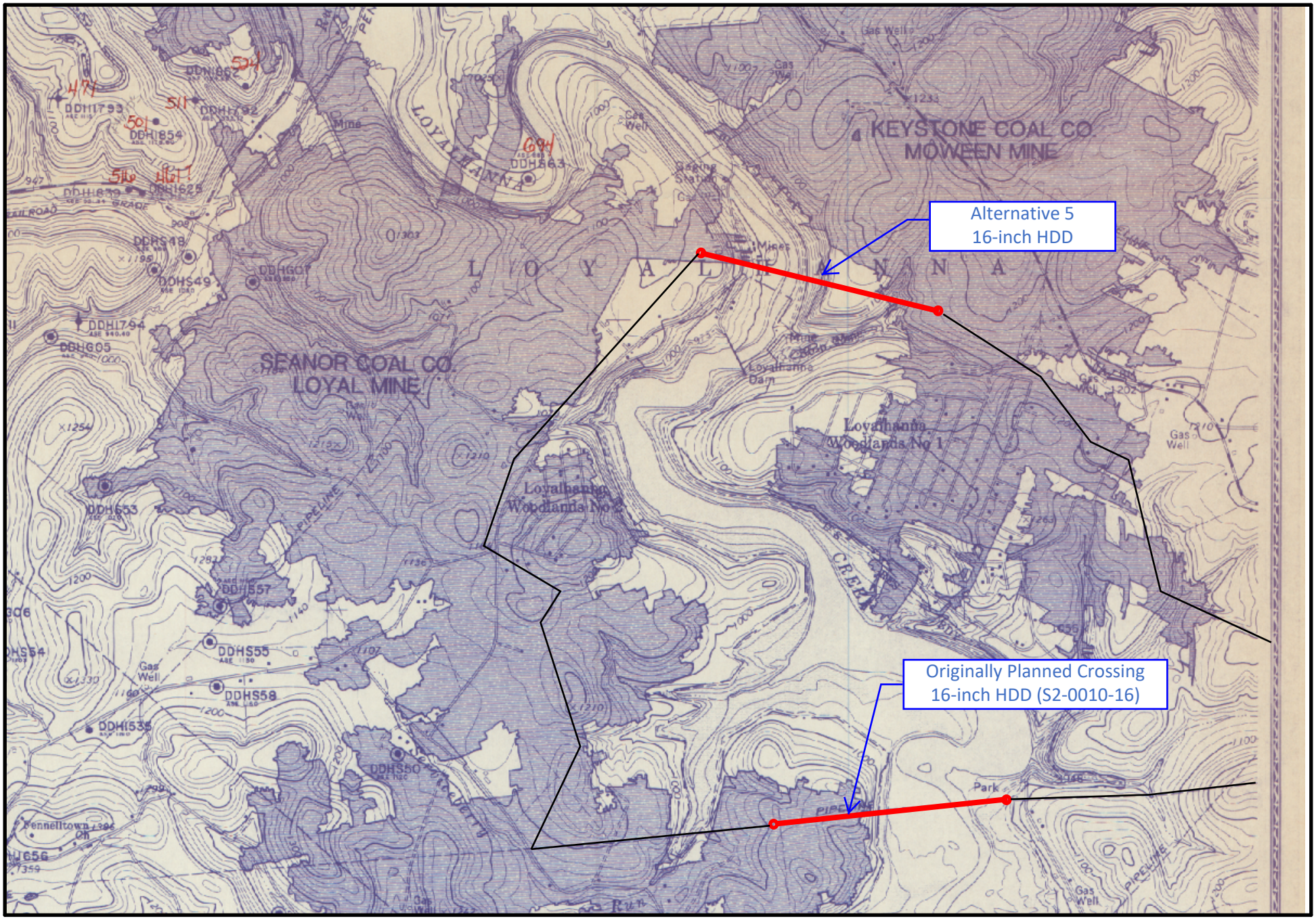
HORIZONTAL DIRECTIONAL DRILL
LOYALHANNA LAKE ALT #5
PENNSYLVANIA PIPELINE PROJECT

SCALE: 1"=300' | DWG. NO: 16" REROUTE

EXHIBIT 5

Map of Deep Mines in Vicinity of Loyalhanna Lake and Alternative 5

Exhibit 5. Map of Deep Mines in Vicinity of Loyhalhanna Lake and Alternative 5



The Department cannot verify the accuracy or completeness of this information or alignment of images.

0 3338 feet

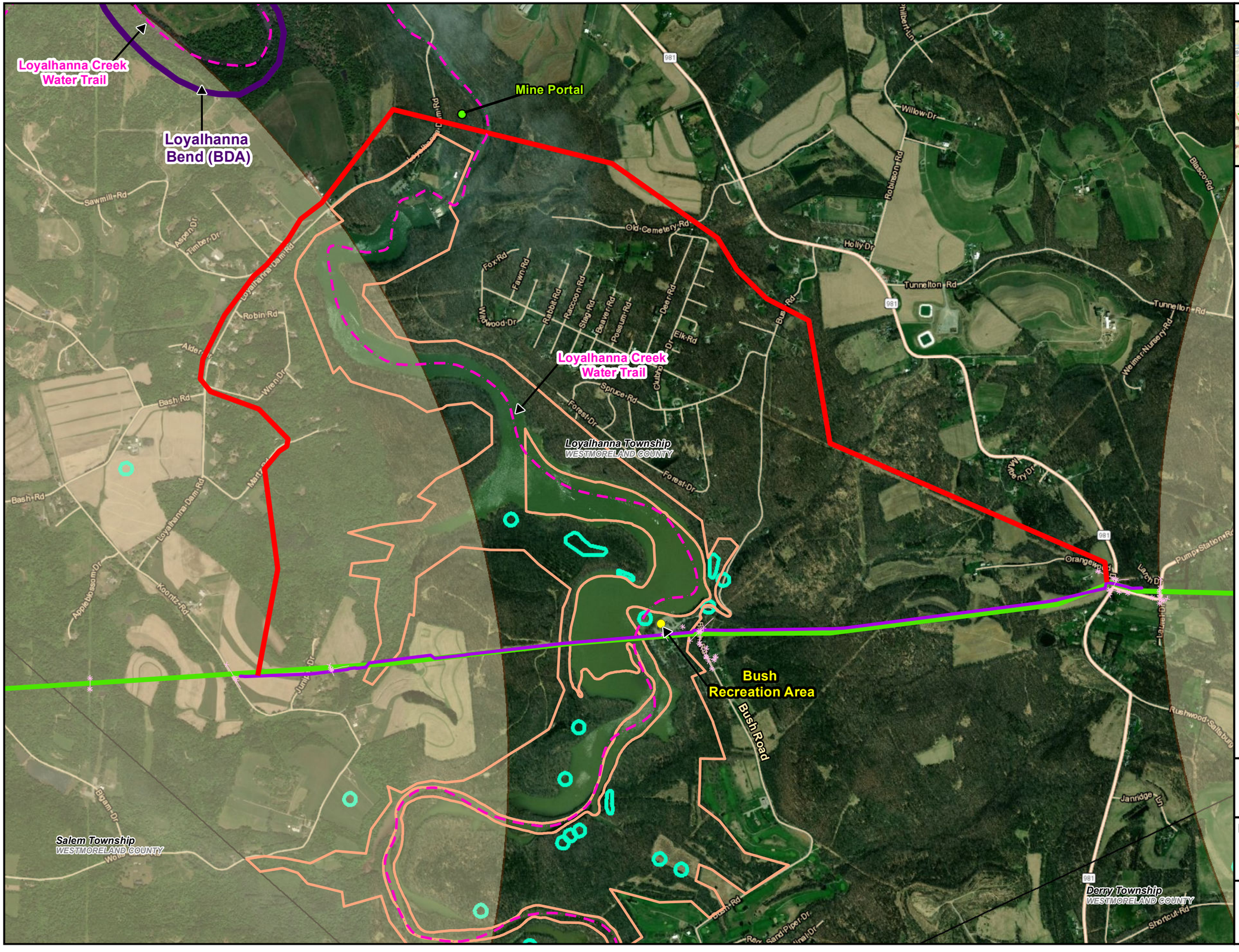
Created on: 08/30/19

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

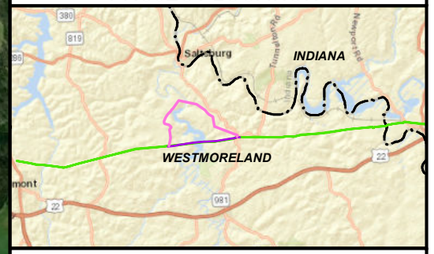
EXHIBIT 6

Environmental Resources in Vicinity of Potential Loyhalhanna Lake Alternative 5, Westmoreland County, PA

DO NOT DISTRIBUTE - PRIVILEGED INFORMATION



PROJECT LOCATION



Legend

- Potential Reroute Alternative
- Proposed/Permitted Route
- Original Proposed Route (ME1)
- Existing Electric Line
- Trails
- USACE Property Boundary – Loyalhanna Lake
- Bush Recreation
- Biological Diversity Area (BDA)
- Northern Long-eared Bat 3-mile Capture Buffer
- Archeological Site
- Municipal Boundary

0 750 1,500 Feet

N

Exhibit 6. Environmental Resources in Vicinity of Potential Loyhalhanna Lake Alternative 5, Westmoreland County, PA

Prepared By:	Date:
TETRA TECH	09/2019

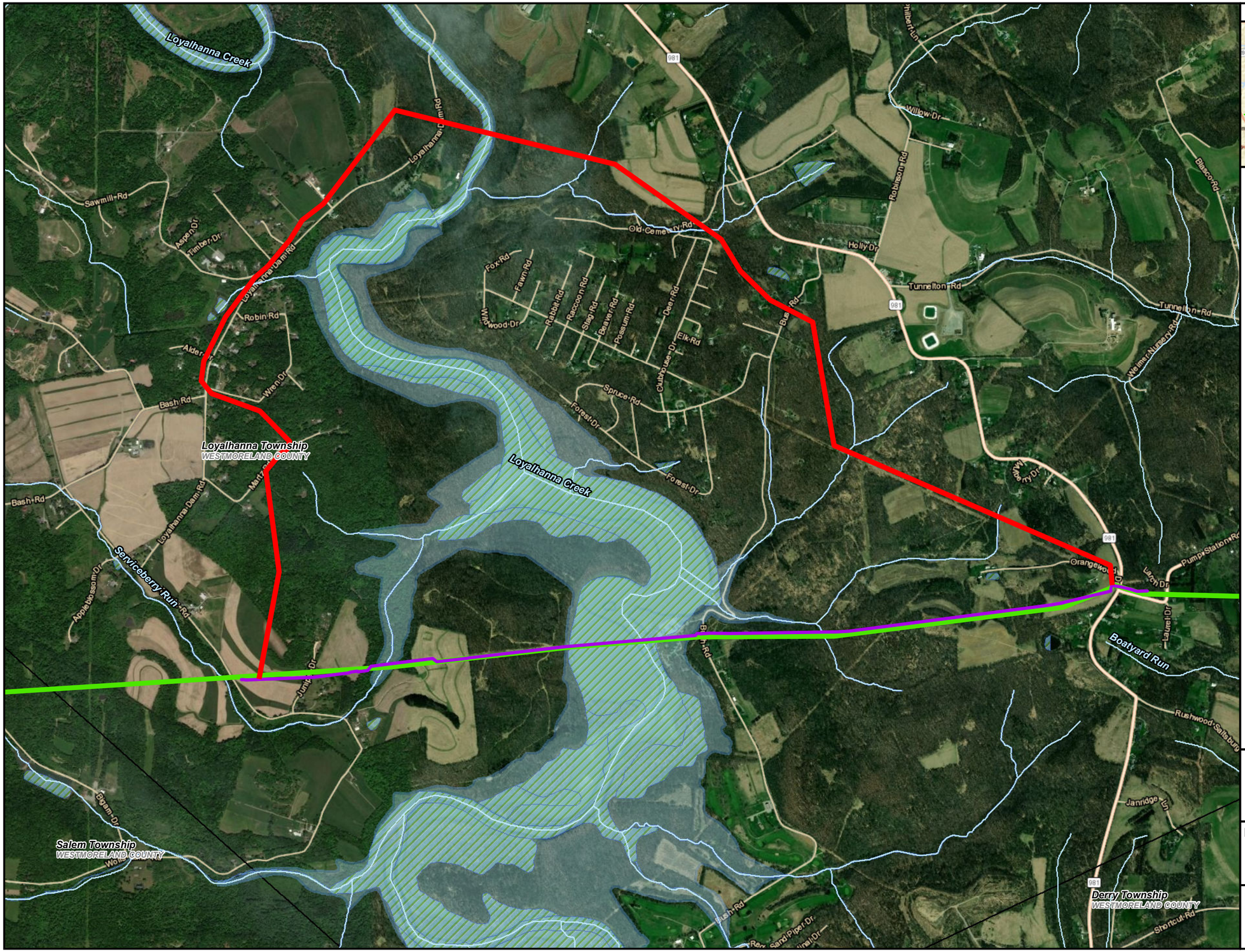
Base Map;
ESRI World Imagery, 4/2014-5/2015

Coordinate System: WGS 84

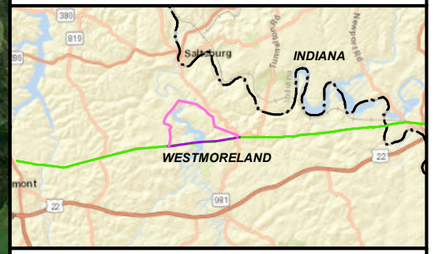
E:\GIS\Projects\112C05958-PPP\MXD\MajorAlternatives\Figure1EnviroResourcesAlt5.mxd JL

EXHIBIT 7

Mapped Wetlands and Waterbodies in Vicinity of Potential Loyhalhanna Lake Alternative 5, Westmoreland County, PA



PROJECT LOCATION



Legend

- Potential Reroute Alternative
- Proposed/Permitted Route
- Original Proposed Route (ME1)
- National Wetlands Inventory (NWI)
- NHD Flowline
- NHD Area
- Municipal Boundary

0 750 1,500 Feet

N

Exhibit 7. Mapped Wetlands and Waterbodies in Vicinity of Potential Loyhalhanna Lake Alternative 5, Westmoreland County, PA

Prepared By: TETRA TECH

Date: 09/2019

Base Map;
ESRI World Imagery, 4/2014-5/2015

Coordinate System: WGS 84

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