Site Restoration and Post-Construction Stormwater Management Plan

Pennsylvania Pipeline Project - South East Region: Spread 6

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Prepared for:
Sunoco Logistics, L.P.
525 Fritztown Road
Sinking Spring, PA 19608

Prepared by:
Tetra Tech, Inc.
661 Andersen Drive
Pittsburgh, PA 15220

TABLE OF CONTENTS

Section **Page**

TABLES

LIST OF ATTACHMENTS

LIST OF ACRONYMS

ACRONYM	MEANING
% CCE	Calcium carbonate equivalent
% ENV	Effective neutralizing value
ABACT	Antidegradation Best Available Combination of Technologies
BMP	Best Management Practice
E&SC	Erosion and Sediment Control
EV	Exceptional value
HDD	Horizontal directional drilling
HDPE	High-density polyethylene
HQ	High quality
NGL	Natural gas liquids

PA	Pennsylvania
PADEP	Pennsylvania Department of Environmental Protection
PASDA	Pennsylvania Spatial Data Access
PCSM	Post-Construction Stormwater Management
Pls	Pure live seed
ROW	Right of way
SPPP	Sunoco Pennsylvanian Pipeline Project
SR	Site Restoration
TSF	Trout stock fisheries
Tt	Tetra Tech, Inc.
UNT	Unnamed tributary
WWF	Warm water fisheries

1.0 INTRODUCTION

Tetra Tech, Inc. (Tt) has prepared this Site Restoration and Post-Construction Stormwater Management (PCSM) Plan (Plan) for Sunoco Pipeline, L.P. (SPLP) – Pennsylvania Pipeline Project, South East Region: Spread 6. The Plan addresses activities associated with the Sunoco Pennsylvania Pipeline Project (SPPP) installation. Spread 6 (South East Region) of this project is located in Chester and Delaware Counties, Pennsylvania (PA). A site location map is provided in Attachment 1. The site restoration portion of the Plan will ensure prompt and effective stabilization of the pipeline right of way, associated workspaces, temporary access roads, and the vegetated block valve site (Middletown Road block valve) following pipeline construction, and the PCSM portion of the Plan will manage stormwater runoff from the permanent impervious aboveground facilities (block valve sites) and associated permanent access roads associated with the project.

2.0 SITE DESCRIPTION

Sunoco Pipeline, L.P. (SPLP) proposes to construct and operate the Pennsylvania Pipeline Project that would expand existing pipeline systems to provide natural gas liquid (NGL). The project involves the installation of approximately two parallel pipelines within a 306.8-mile, 50-foot-wide right-of-way (ROW) from Houston, Washington County, Pennsylvania (PA) to SPLP's Marcus Hook facility in Delaware County, PA with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline would be installed within the ROW from Houston to Marcus Hook (306.8 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, PA to the Marcus Hook facility, paralleling the initial line for approximately 255.8 miles. The majority of the new ROW will be co-located adjacent to existing utility corridors, including approximately 230 miles of pipeline that will be co-located in the existing SPLP Mariner East pipeline system. The 20-inch pipeline will be installed first, followed by the 16-inch line. Any temporary stabilization required will be implemented in accordance with this Erosion and Sediment (E&S) Plan. Both pipelines will be installed within the same limit of disturbance (LOD) and in the same construction period. This SR and Post Construction Stormwater Management Plan specifically relates to impacts associated with the South East Region, Construction Spread 6.

Fifty feet will be maintained as permanent ROW. In addition, temporary use areas or extra workspaces will be required at some stream and road/railroad crossings; these will typically expand the construction ROW by 25 feet where needed. Construction activities will involve tree removal, clearing and grubbing within the ROW, trenching, pipe installation, and SR. The total LOD in the South East Region will be approximately 268 acres. Acres disturbed by county will be as follows: Chester County with 171 acres disturbed, and Delaware County with 97 acres disturbed.

Past and present land use of the project area and surrounding area is agricultural and forested land. Future land use will be a maintained vegetated natural gas pipeline ROW and agricultural land and forested land. Relevant

topographic features including streams, streets, pipelines, structures, utility lines, fences, paving and other significant items along the gas line alignment are indicated on the plans, where applicable.

Five new block valve locations are proposed for the PADEP Southeast Region portion of the PPP project. Two additional block valves are proposed at existing sites, Elverson Interchange and Eagle Station, and do not expand the current impervious footprint or require grading. Below is a summary table of the primary receiving waters for the block valves.

Table 1
Block Valve and Station Summary Table

Block valve/Station	Co-located or New	County	Township	Receiving water	Designated Use	Existing use	Impairments	PCSM Required?
Elverson Interchange	Existing no change in footprint	Chester	Elverson	UNT to Conestoga River	WWF	-	None	No
Fairview Road	New	Chester	Wallace	Marsh Creek	HQ-TSF	-	None	Yes
Eagle	Existing no change in footprint	Chester	Upper Uwchlan	UNT to Black Horse Creek	HQ-TSF	-	None	No
East Lincoln Highway	New	Chester	West Whiteland	Trib 00276 to Valley Creek	CWF	-		Yes
Boot Road	New	Chester	West Goshen	Trib 00682 to Ridley Creek	HQ-TSF	-		Yes
Middletown Road	New	Delaware	Thornbury	Trib 00599Chester Creek	TSF	-		Yes
S. Pennell Road	New	Delaware	Middletown	Trib 00576 to Chester Creek	TSF	-		Yes

2.1 TOPOGRAPHY

The work zone is located on ground of varying elevations. Site elevations vary from 23 feet (Chester Creek in Delaware County) to 741 feet (western border of Chester County) above mean sea level based on the Pennsylvania Spatial Data Access (PASDA). The construction plans show the topography of the site and the surrounding area.

2.2 GEOLOGY AND SOILS

The soils and geologic formations surrounding the site are shown on the figures provided in Attachment 2. Attachment 2 also provides soil descriptions and properties of the soils found at the site. In general, the following actions will be taken to counteract soil limitations:

1. Erodible Soils - Prompt stabilization practices will be implemented to minimize the risk of erosion. PCSM facilities have been designed to minimize point-source discharges which increase the likelihood of downstream erosion.

2. Cut Banks Caves - Almost all Pennsylvania soils are susceptible to caving of cut banks. Cut slopes will be stabilized as soon as possible with seed and mulch to prevent sliding. Slopes are designed to not exceed 2H:1V.

3. Corrosive to Concrete or Steel Pipe - Pipes to be used on site shall be either HDPE or coated steel.

4. High Water Table - A seasonal high groundwater determination was conducted at the proposed block valve sites. PCSM facilities that infiltrate have been designed to maintain a 20" separation from the seasonal high groundwater table.

5. Low Strength - Most of Pennsylvania soils (73%) have relatively low strength. Precautions will be taken to prevent slope failures due to improper construction practices. Soils will be evaluated during construction of block valve sites and PCSM facilities to determine whether additional measures will need to be taken.

6. Piping Tendencies -Piping is the erosion by percolating waters or seepage in layer of subsoil resulting in caving and the formation of tunnels or pipes thorough which the soluble or granular material is removed. Where necessary, anti-seep collars will be used to prevent piping.

7. Poor Topsoil -Soil amendments will be added to site soils to promote vegetative growth.

8. Potentially Hydric -A wetland delineation has been performed to determine the presence of wetlands.

9. Potential Sinkhole - Should a sinkhole be encountered during construction, repair should be done under the direct observation and supervision of a professional geologist or licensed geotechnical engineer. Site specific sinkhole repairs should be developed on a case by case basis. Block valves located within karst topography have been identified, and infiltration practices have been designed to minimize the risk of sinkholes.

To prevent sediment from leaving the site, stabilization practices will be implemented in disturbed areas as soon as practical. Geologic formations or soil conditions that may have the potential to cause pollution after earth disturbance were not observed during field activities. Infiltration tests are being performed and results are being evaluated for the design of the proposed post construction stormwater BMP's. The volume of the

proposed PCSM BMP is considered conservative because the BMP has been designed to store the required volume increase without accounting for infiltration rates until the test results have been evaluated.

2.3 SURFACE WATER HYDROLOGY

The SPPP area surface water runoff drains to surface waters and unnamed tributaries (UNT's) designated as high quality (HQ), warm water fisheries (WWF), exceptional value (EV), cold water fisheries (CWF), and trout stock fisheries (TSF) under Pa. Code 25 Chapter 93. Descriptions of the Primary Receiving Waters can be found in Table 1.

The plan contains Antidegradation Best Available Combination of Technologies (ABACT) BMPs to maintain the designated use of the receiving waters and prevent additional siltation from polluting the streams. The locations of the receiving waters relative to the project area can be seen on the USGS location map in Attachment 1.

3.0 SITE RESTORATION PRACTICES

Section 3.0 addresses restoration of the mainline pipeline, temporary workspaces, temporary access roads, and the Middletown Road block valve site which will be vegetated. Following completion of pipeline installation and trench backfilling, the pipeline ROW, associated workspaces, and temporary access roads shall be returned to the general grade present prior to pipeline installation in order to maintain preconstruction drainage patterns. After completion of major construction work, topsoil that was stockpiled during construction will be placed along the ROW. Grounds disturbed by any of the operations necessary to complete the work for this project within the ROW are to be permanently seeded, or if specified, sodded, unless occupied by structures, paved, or designated as a permanent access road. Disturbed areas, which are at final grade, shall be seeded and mulched once final grades are achieved. The permanent seed mixture will restore disturbed areas to a meadow in good condition or better. If seeding cannot be completed within a 4 day period due to weather conditions, the disturbed area will be mulched with straw at the rate of 3 tons per acre. This straw will be anchored using a method described in Section 3.4.

3.1 BMP DESCRIPTION AND CONSTRUCTION SEQUENCE

A generalized construction sequence is provided below. The construction sequence is intended to provide a general course of action to conform to the applicable regulatory agency requirements for restoration and post-construction stormwater management of the site. Necessary steps for proper and complete execution of work pertaining to this plan, whether specifically mentioned or not, are to be performed by the contractor. The contractor will comply with all requirements listed in this section. The contractor may be required to alter controls based on the effectiveness of controls or differing conditions encountered in the field. The appropriate county conservation district and DEP shall be contacted and must approve any deviation to the authorized plans.

A pre-construction meeting is required prior to the start of any construction activity. The Pennsylvania Department of Environmental Protection (PADEP) or applicable county conservation district, contractors, the landowner, appropriate municipal officials, and the plan preparer must be invited to this meeting at least 7 days in advance.

General Construction Sequence

1. Grade surface to finished grade elevations as soon as practicable following completion of pipe installation.

2. Surface roughening will be utilized to rough the soil surface with horizontal depressions for the purpose of reducing runoff velocity, increasing infiltration, aiding the establishment of vegetation, and reducing erosion. Surface roughening should be applied to slopes 3H:1V or steeper unless a stable rock face is provided or it can be shown that there is not a potential for sediment pollution to surface waters. For roughened surfaces within 50 feet of a surface water, and where blanketing of seeded areas is proposed as the means to

achieving permanent stabilization, spray-on type blankets are recommended. Surface roughening shall be accomplished using dozers affixed with grouser tracked equipment. Dozers shall run up and down the slopes leaving horizontal grooves perpendicular to the slope. Dozer blades shall be raised and not used during surface roughening. Where compaction does occur, contractor shall scarifiy the soil or provide additional roughening such as deep ripping or chisel ripping to restore the area to a minimal compacted state. In areas of proposed infiltration, soils shall be amended to 2' below grade. See Soil Amendment and Restoration construction sequence below.

3. Place topsoil from topsoil stockpiles as the upper layer of backfill. Topsoil shall not be placed when the subgrade is frozen or when it is excessively wet or dry and shall not be handled when in a frozen or muddy condition.

4. Remove gravel and geotextile from the temporary access roads and scarify the soil. Refer to step 2 of this sequence to address compaction at access roads. After addressing compaction concerns, place topsoil that was stripped prior to installation of the access roads.

5. Immediately seed and mulch disturbed areas in accordance with the permanent seeding schedule once final grade is established and topsoil is placed.

6. Maintain erosion and sedimentation control devices until site work is complete and a uniform 70-percent perennial vegetative cover is established. Regrade and revegetate areas disturbed during the removal of the erosion and sediment controls.

Soil Amendment and Restoration Construction Sequence

1. Grade surface to finished grade elevations as soon as practicable following completion of pipe installation.

2. In the designated soil amendment area, till the ground and mix in the compost at a ratio of 2:1 (soil:compost) to a depth of 24 inches.

3. Immediately seed and mulch disturbed areas once final grade is established in accordance with the permanent seeding schedule.

4. Maintain erosion and sedimentation control devices until site work is complete and a uniform 70% perennial vegetative cover is established.

Permanent Seeding

Site preparation and establishment of permanent cover will be conducted according to the following guidelines:

RECOMMENDED SEED MIXTURES			
MIXTURE NO.	**SPECIES**	**SEEDING RATES – PLS (1)**	
		MOST SITES	ADVERSE SITES (9)
1 (2)	spring oats (spring), or 64 96	64	96
	annual ryegrass (spring or fall), or	10	15
	winter wheat (fall), or	90	120
	winter rye (fall)	56	112
2 (3)	tall fescue, or 75	60	75
	fine fescue, or 40	35	40
	kentucky bluegrass, plus 25 30	25	30
	redtop(4), or	3	3
	perennial ryegrass	15	20
3	birdsfoot trefoil, plus 6 10	6	10
	tall fescue	30	35
4	birdsfoot trefoil, plus	6	10
	reed canarygrass	10	15
5 (5)	Big Bluestem, plus	10	15
	tall fescue, or	20	25
	perennial ryegrass	20	25
6 (5,6)	Big Bluestem, plus	10	15
	annual ryegrass	20	25
7 (5)	birdsfoot trefoil, plus	20	30
	Big Bluestem, plus	20	30
	tall fescue	20	25
8	flatpea, plus	20	30
	tall fescue, or	20	30
	perennial ryegrass	20	25

RECOMMENDED SEED MIXTURES			
MIXTURE NO.	**SPECIES**	**SEEDING RATES – PLS (1)**	
		MOST SITES	ADVERSE SITES (9)
9 (7)	serecia lespedeza, plus	10	20
	tall fescue, plus	20	25
	redtop(4)	3	3
10	tall fescue, plus	40	60
	fine fescue	10	15
11	deertongue, plus	15	20
	birdsfoot trefoil	6	10
12(8)	switchgrass, or	15	20
	big bluestem, plus	15	20
	birdsfoot trefoil	6	10
13	orchardgrass, or	20	30
	smooth bromegrass, plus	25	35
	birdsfoot trefoil	6	10

1. Pure live seed (pls) is the product of the percentage of pure seed times percentage germination divided by 100. For example, to secure the actual planting rate for switchgrass, divide 12 pounds pls shown on the seed tag. Thus, if the pls content of a given seed lot is 35 percent, divide 12 pls by 0.35 to obtain 34.3 pounds of seed required to plant one-acre. All mixtures in this table are shown in terms of pls.

2. If high-quality seed is used, for most sites seed spring oats at a rate of two bushels per acre, winter wheat at 11.5 bushels per acre, and winter rye at one bushel per acre. If germination is below 90 percent, increase these suggested seeding rates by 0.5 bushel per acre.

3. This mixture is suitable for frequent mowing. Do not cut shorter than 4 inches.

4. Keep seeding rate to that recommended in table. These species have many seeds per pound and are very competitive. To seed small quantities of small seeds such as weeping lovegrass and redtop, dilute with dry sawdust, sand, rice hulls, buckwheat hulls, etc.

5. Use for highway slopes and similar sites where the desired species after establishment is Big Bluestem.

6. Use only in extreme southeastern or extreme southwestern PA. Serecia lespedeza is not well adapted to most of PA.

7. Do not mow shorter than 9 to 10 inches.

8. Note not applicable because Crownvetch is not proposed.

9. If liming, fertilization, and preparation of seedbed are properly done and if care is taken to drill and cover the seed (or mulch applied), the rate for "most sites" should suffice. However, on eroded or coarse and poorly prepared seedbeds, particularly if the soil is very acidic or infertile, the rate for "adverse sites" should be used.

PENNDOT FORMULA B				
Seeding Rate	3 lbs. per 1,000 square feet			
Species	**% by Weight**	**Purity %**	**Minimum % Germination**	**Maximum % Weed Seed**
Kentucky Bluegrass	50	98	80	0.20
Perennial Rye	20	98	90	0.15
Red Fescue	30	98	85	0.15

Liming Rates

Minimum 6 tons per acre at 100% effective neutralizing value (% ENV), unless the soil test determines that a lesser amount is needed. To determine the actual amount of regular lime to apply, divide the amount called for by the soil test by the % ENV for the product used. For example, if 6 tons per acre is needed and the %ENV for the lime used is 88%, divide 6 by 0.88 resulting in 6.8 tons needing to be applied. For dolomitic lime, which has a significant amount of magnesium in it, divide the amount called for by the soil test by the % calcium carbonate equivalent (% CCE) listed for the product instead of the % ENV. The % CCE may be above 100% which accounts for the fact that magnesium has a greater effect per pound than the calcium in regular lime. Note: When a soil test requires more than 8,000 pounds of lime per acre, the lime must be mixed into the top 6 inches of soil.

Fertilization Rates

Apply 10-20-20 at 600 pounds/acre, if top dressed or 1,000 pounds/ac, if incorporated, unless the soil test determines that the rate can be less than these minimums.

SOIL AMENDMENT APPLICATION RATE EQUIVALENTS				
Soil Amendment	Per Acre	Per 1,000 sq. ft.	Per 1,000 sq. yds.	
AGRICULTURAL LIME	6 TONS	240 LBS.	240 LBS.	or as per soil test; may not be required in agricultural fields
10-20-20 FERTILIZER	1,000 LBS.	25 LBS.	25 LBS.	or as per soil test; may not be required in agricultural fields

SITE CONDITIONS	NURSE CROP	SEED MIXTURE (SELECT ONE MIXTURE)
SLOPES AND BANKS (NOT MOWED)		
WELL-DRAINED	1 PLUS	3, 5, 8, OR 12 (1)
VARIABLE DRAINAGE	1 PLUS	3 OR 7
SLOPES AND BANKS (MOWED)	1 PLUS	2 OR 10
WELL-DRAINED		
SLOPES AND BANKS (GRAZED/HAY)	1 PLUS	2,3, OR 13
WELL-DRAINED		
GULLIES AND ERODED AREAS	1 PLUS	3, 5, 7, OR 12 (1)
EROSION CONTROL FACILITIES (BMPS)		
SOD WATERWAYS, SPILLWAYS, FREQUENT WATER FLOW AREAS	1 PLUS	2, 3, OR 4
DRAINAGE DITCHES		
SHALLOW, LESS THAN THREE FEET DEEP	1 PLUS	2, 3, OR 4
DEEP, NOT MOWED	1 PLUS	5 OR 7
POND BANKS, DIKES, LEVEES, DAMS, DIVERSION CHANNELS, AND OCCASIONAL WATER FLOW AREAS		
MOWED AREAS	1 PLUS	2 OR 3
NON-MOWED AREAS	1 PLUS	5 OR 7
FOR HAY OR SILAGE ON DIVERSION CHANNELS AND OCCASIONAL WATER FLOW AREAS	1 PLUS	3 OR 13
HIGHWAYS (2)		
NON-MOWED AREAS		
	1 PLUS	5, 7, 8, 9, OR 10
WELL-DRAINED	1 PLUS	3 OR 7
VARIABLE DRAINED	1 PLUS	3 OR 9
POORLY DRAINED	1 PLUS	2, 3, OR 10
AREAS MOWED SEVERAL TIMES PER YEAR		
UTILITY ROW		
WELL-DRAINED	1 PLUS	5, 8, OR 12 (1)
VARIABLE DRAINED	1 PLUS	3 OR 7
WELL-DRAINED AREAS FOR GRAZING/HAY	1 PLUS	2, 3, OR 13
EFFLUENT DISPOSAL AREAS	1 PLUS	3 OR 4

SITE CONDITIONS	NURSE CROP	SEED MIXTURE (SELECT ONE MIXTURE)
SANITARY LANDFILLS	1 PLUS	3, 5, 7, 11 (1), OR 12 (1)
SURFACE MINES SPOILS, MINE WASTES, FLY ASH, SLAG, SETTLING BASIN RESIDUES AND OTHER SEVERELY DISTURBED AREAS (LIME TO SOIL TEST) SEVERELY DISTURBED AREAS FOR GRAZING/HAY	1 PLUS 1 PLUS	3, 4, 5, 7, 8, 9,11 (1) OR 12(1) 3 OR 13

1. For seed mixtures 11 and 12, only use spring oats or weeping lovegrass (included in mix) as nurse crop.

2. Contact PennDOT district roadside specialist for specific suggestions on treatment techniques and management practices.

Temporary Seeding

Temporary grass cover will be established in the following areas where soil stockpiles are exposed for a period greater than 4 days. The seed mixture for temporary cover will consist of 100% annual ryegrass. Seed will be applied at the rate of 40 pounds per acre or as recommended by a local recognized seed supplier approved by the Owner's representative. Prior to seeding, apply 1 ton of agricultural grade limestone per acre plus 10-10-10 fertilizer at the rate of 500 pounds per acre and work into the soil.

Mulching

The purpose of mulch is to reduce runoff and erosion, prevent surface compaction or crusting, conserve moisture, aid in establishing plant cover, and control weeds. Mulch will be applied on any area subject to erosion or that has unfavorable conditions for plant establishment and growth. The practice may be used alone or in conjunction with other structural and vegetative conservation practices such as waterways, ponds, sedimentation traps, or critical area planting. On sediment-producing areas where the period of exposure is less than 2 months, mulch materials will be applied according to the following guidelines:

1. Straw mulch will be applied at the rate of 3 tons per acre. Chemically treated or salted straw is not acceptable as mulch.

2. Straw mulch will be anchored immediately after application by at least one of the following methods:

   A. "Crimped" into the soil using tractor-drawn equipment (straight-bladed coulter or similar).

      This method is limited to slopes no steeper than 3:1. Machinery should be operated on the contour. (Crimping of hay or straw by running it over with tracked machinery is not recommended.)

   B. Asphalt, either emulsified or cut-back, containing no solvents or other diluting agents toxic to plant or animal life, uniformly applied at the rate of 31 gallons per 1,000 square feet.

C. Synthetic binders (chemical binders) may be used as recommended by the manufacturer to anchor mulch provided that sufficient documentation is provided to show that it is non-toxic to native plant and animal species.

D. Lightweight plastic, fiber, or paper nets may be stapled over the mulch according to the manufacturer's recommendations.

Mulched areas will be checked periodically and after each runoff event (e.g., rain, snowmelt, etc.) for damage until the desired purpose of the mulching is achieved. Damaged portions of the mulch or tie-down material will be repaired upon discovery.

3.2 MATERIAL RECYCLING AND DISPOSAL

The operator will remove from the site, recycle, or dispose of all building materials and wastes in accordance with PADEP's solid waste management regulations at 25 Pennsylvania Code 260.1 et seq., 271.1 et seq., and 287.1 et seq. The contractor will not illegally bury, dump, or discharge building material or wastes at the site. Excess material brought into the site areas to facilitate construction access will be completely removed prior to rough grading and final surface stabilization. Expected construction wastes during site restoration will consist of packaging material and sediment cleaned from E&SC BMPs. Packaging from materials brought on site will be disposed of by a licensed hauler. Sediment removed from BMPs will either be spread in a protected area to dry and then recycled as fill material prior to permanent seeding or disposed of off-site. In cases where disposal is necessary, waste materials will be disposed of at an approved PADEP waste site.

3.3 THERMAL IMPACTS

Thermal impacts are most commonly associated with urbanization (i.e., increased impervious surfaces) that results in heated stormwater runoff flowing into receiving waters where it mixes, and potentially increases the base temperature of the surface water in streams. However, another contributing factor for stream temperature is solar exposure (radiant energy input) to the surface water, typically ponded, standing waters. The amount of heat transferred, and the degree of thermal pollution is of importance for fisheries management and the ecological integrity of receiving waters. Among the attributes that determine the contribution of solar energy to thermal impacts are the presence of riparian vegetation, as well as stream width, depth, flow regime (perennial, intermittent, ephemeral), and orientation.

Thermal impacts have been minimized by limiting the disturbed area to the maximum extent practicable. By minimizing the extent of the disturbed area, vegetative clearing, including forested areas, has been minimized. Following installation of the pipelines, existing grades along the pipeline right of way, additional temporary workspaces, and temporary access roads will be restored, permanent seeding will occur as soon as practicable to facilitate vegetative growth during germinating months, and the the addition/creation of impervious surfaces in riparian areas has been avoided. By returning these areas to their existing grades, stormwater is unlikely to

pond in these locations therefore minimizing the potential for ponded water to result in significant contributions to thermal impacts in receiving waters. In addition, thermal impacts will be minimized during site restoration by facilitating permanent seeding as soon as practicable to encourage vegetative growth. Although shade cover will be reduced in areas that were previously forested, there is no anticipated adverse effect to the receiving watersheds because the project will only clear a narrow corridor of vegetation within each respective watershed. The Project does not have thermal impacts. Specifically, thermal impacts will be avoided by implementing the following:

- Siting parallel to and overlapping with existing ROWs to minimize vegetation clearing at stream crossings;
- Reducing the construction ROW width and additional temporary workspaces at stream crossings;
- No grubbing, grading, or clearing of trees will occur within 50 feet of the top of stream bank until pipeline construction/installation is ready to proceed through that area.
- Restoring (seeding) disturbed areas/ROW as soon as practicable and /or directing runoff to vegetated areas to reduce the temperature of runoff prior to discharge into the streams; and,
- Restoring the stream banks and seeding/planting as soon as practicable to facilitate vegetative growth along the stream channel.

3.4 RIPARIAN FOREST BUFFERS

Pennsylvania Pipeline Project - Riparian Forest Buffer Waiver Request

The Pennsylvania Pipeline Project qualifies for an exception of the riparian forest buffer requirement under Chapter 102.14(d)(1)(ix) for areas within the Chapter 105 permit area. Existing riparian forest buffers within the project area are identified on the E&S plan drawings in Attachment 2 of the E&S Plan.

In addition to the exception, we are requesting a waiver under 102.14(d)(2)(ii) for areas within 150' of surface waters that are outside of the Chapter 105 permit area. A detailed riparian buffer waiver request has been prepared as an attachment to the ESCGP-2 Notice of Intent.

Demonstration of Waiver Necessity

A riparian forest buffer waiver is necessary to complete the intended scope of the pipeline project. The project involves the installation of approximately two parallel pipelines within a 306-mile, 50-foot-wide ROW from Houston, Washington County, PA to SPLP's Marcus Hook facility in Delaware County, PA with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline would be installed within the ROW from Houston to Marcus Hook (306 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, PA to the Marcus Hook facility, paralleling the initial line for approximately 255 miles.

Spread 6 (South East Region) of this project crosses through Chester and Delaware Counties, PA. Due to the linear nature of the project and the surrounding topography, riparian forest buffers could not be avoided altogether.

Alternatives Analysis

Impacts to environmental resources, including riparian forest buffers, were evaluated during the pipeline routing phase of the project. Field teams were deployed to evaluate alternate routes based on environmental and constructability constraints. The final route that was selected minimizes environmental impacts to the maximum extent practicable while still maintaining the project's overall constructability and ensuring a safe working environment while also taking landowner constraints into consideration. Additionally, several variations of horizontal direction drill profiles were evaluated to minimize pullback areas, additional workspaces, and overall disturbance within riparian forest buffers. Permanent features, such as access roads and block valves, were evaluated to locate the features outside of the riparian forest buffer, where possible.

Demonstration of Minimizing Impacts

All disturbance activities, including those which impact riparian forest buffers, have been reduced to the maximum extent practicable. The LOD has been reduced to 50 feet wide at all stream crossings within the riparian forest buffer area where possible adjacent to the stream area required for crossing and construction. In areas where it is not practicable to reduce the LOD throughout the entire extent of the riparian forest buffer, the LOD has been reduced to 50 feet wide within 10 feet of the stream banks to limit the proximity of the work areas as per the stream crossing detail from the 2012 PADEP Erosion and Sediment Control Program Manual. The operations within the LOD near stream crossings typically includes a topsoil stockpile, a stockpile for pipe trench excavation material, a pipe trench, a travel lane, a work area for equipment operation and pipeline welding outside the trench, and an area to install the erosion control BMPs. In addition, site conditions such as steep slopes, varying depths of topsoil, and other on-site conditions limit the amount of work area. Reducing the LOD to a greater extent could potentially result in unsafe working conditions and would hinder the ability to complete the stream crossing within the required time frame of 24 hours or less. Workspaces that provide additional space for stream crossing activities have been placed outside of riparian forest buffers where possible.

Meeting Requirements of Chapter 102

All other aspects of Chapter 102 are being met. The project's E&SC Plan and SR/Post-Construction Stormwater Management Plan have been designed in accordance with Chapter 102. In accordance with Chapter 102, and E&S plan has been developed to minimize the sediment entering the buffer areas. A SR plan is proposed to revegetate the areas adjacent to the buffers within the ROW.

3.5 INSPECTION AND MAINTENANCE PROCEDURES

Seeded areas will be inspected weekly and after each runoff event for bare spots, washouts, and healthy growth. Necessary repairs will be made immediately. Mulched areas will be checked periodically and after severe storms for damage until the desired purpose of the mulching is achieved. Damaged portions of the mulch or tie-down material will be repaired upon discovery.

All sedimentation control measures will remain in place until the disturbed areas are stabilized and a uniform 70-percent perennial vegetative cover is established. Any area not achieving a 70-percent vegetative cover will be reseeded and mulched within 24 hours of detection. If BMPs are found to be inoperative or ineffective during an inspection, PADEP should be contacted within 24 hours, followed by submission of a written noncompliance report to PADEP within 5 days of the initial contact.

Long-Term Maintenance

Long-term maintenance of the pipeline ROW will include periodic visual inspections for sufficient vegetative growth and cover. Insufficient vegetative cover is defined as any area not achieving a uniform 70-percent perennial vegetative cover. Bare spots and areas with insufficient vegetative cover will be reseeded and mulched within 24 hours of discovery. The ROW will be inspected for signs of erosion, especially on steep slopes. Corrective measures will be taken, as needed. If there is evidence of trench settling, the area will be regraded to maintain pre-construction drainage patterns, mulched, and seeded. A written report is required for each inspection and for each repair or maintenance activity, and the report should specify how to access the site. SPLP is responsible for maintaining the ROW under the provisions of this permit.

3.6 ANTIDEGRADATION REQUIREMENTS

Earth- disturbance activities associated with the Pennsylvania Pipeline project will be located within siltation-impaired watersheds and HQ/EV special protection watersheds. A combination of non-discharge alternatives and the use of ABACT BMPs on site will protect the water quality of the receiving waters, in accordance with 25 Code §102.8(h).

Non-discharge alternatives were evaluated to minimize accelerated erosion and sedimentation and achieve zero net change in runoff between the pre- and post-construction conditions. The non-discharge alternatives evaluated were the use of infiltration and maintaining pre-construction drainage patterns within the right of way, temporary additional workspaces, and temporary access roads. The non-discharge alternatives were incorporated wherever feasible by minimizing soil compaction, restoring the infiltration capacity of the soil prior to permanent seeding, and restoring the disturbed area back to its original grade and cover condition for the mainline pipeline. The extent of the disturbed area will be minimized, and the duration of disturbance will be minimized by stabilizing disturbed areas as soon as practicable. ABACT BMPs will be used on site to protect and maintain the existing water quality of receiving waters.

Due to the linear nature of this project, all of the siltation impaired and HQ/EV special protection watersheds received the same non discharge alternative evaluation and incorporation of ABACT site restoration BMPs throughout the pipeline.

ABACT site restoration BMPs will include the following:

- Pre-construction drainage pattern intact
- Minimizing the disturbed area
- No direct discharge to surface waters
- Prompt site restoration
- Proper vegetative cover techniques

3.7 STORMWATER RUNOFF ANALYSIS

This section applies to all areas of the project, excluding permanent access roads and block valve sites. All disturbed areas within the pipeline right of way, additional temporary workspaces, and temporary access roads will be restored to a meadow in good condition or better or a lawn condition. The pre-construction drainage patterns surrounding the project will be maintained for the areas of the project covered under this section. As a result of restoring the pipeline right of way, additional temporary workspaces, and temporary access roads to a meadow condition and maintaining pre-construction drainage patterns in accordance with 25 Pa Code § 102.8(n), there will be no increase in stormwater runoff rate or volume attributed to these locations, and a quantitative stormwater analysis is not required.

Stormwater runoff associated with construction of the permanent gravel access roads and block valve pads is discussed in Section 4.0.

4.0 POST-CONSTRUCTION STORMWATER MANAGEMENT ANALYSIS

Permanent gravel access roads and gravel block valve sites will be constructed as part of this project. A post-construction stormwater management analysis for stormwater runoff associated with these sites is addressed in Sections 4.1 through 4.7. Areas of the project that are being restored to a vegetated condition, including the pipeline right of way, associated workspaces, and temporary access roads are discussed in Section 3.0.

Five new block valve locations are proposed for the PADEP Southeast Region portion of the PPP project. Two additional block valves are proposed at existing sites, Elverson Interchange and Eagle Station, and do not expand the current impervious footprint or require grading. Of those five, four will require post-construction stormwater management. The Middletown Road block valve will be graded and returned to a vegetated condition. The following sections address PCSM for the four valve sites that include a proposed, impervious surface.

4.1 BMP DESCRIPTION NARRATIVE AND CONSTRUCTION SEQUENCE

Infiltration berms, infiltration trenches, slow release trenches and soil amendments will be used to manage stormwater onsite. Additional stormwater conveyance BMPs, including diversion berms, a level spreader, and channels will also be utilized. The proposed PCSM BMPs will be constructed in accordance with the PA Stormwater BMP manual. A description of the proposed PCSM BMPs and stormwater conveyance BMPs is below.

Infiltration Berm

An infiltration berm is a mound of compacted earth with sloping sides that is usually located along a contour on relatively gently sloping sites. Berms can also be created through excavation/removal of upslope material. The infiltration berms will retain flow and allow for infiltration. Infiltration berms will be a maximum of 2 feet high.

Soil Amendment and Restoration

Soil amendment and restoration is the process of improving disturbed soils and low organic soils by restoring soil porosity and adding a soil amendment, such as compost, for the purpose of reestablishing the soil's long-term capacity for infiltration and pollution removal.

Level Spreader

Earthen level spreaders will be used where diversion ditches or berms outlet onto areas of established vegetation. Earthen level spreaders allow sediment-free stormwater runoff to be released in sheet flow down a stabilized slope without causing erosion.

Diversion Berm

A diversion berm is a compacted berm that will be used to divert upslope stormwater runoff. Diversion berms are proposed to reduce the amount of upslope contributory drainage to PCSM BMPs.

Refer to the PCSM plan drawings for the locations of the proposed work for post construction stormwater management. A generalized construction sequence is provided below. The construction sequence is intended to provide a general course of action to conform to the applicable regulatory agency requirements for SR and post-construction stormwater management of the site. Necessary steps for proper and complete execution of work pertaining to this plan, whether specifically mentioned or not, are to be performed by the contractor. The contractor will comply with all requirements listed in this section. The contractor may be required to alter controls based on the effectiveness of controls or differing conditions encountered in the field. The appropriate county conservation district and DEP shall be contacted and must approve any deviation to the authorized plans.

A pre-construction meeting is required prior to the start of any construction activity. The Pennsylvania Department of Environmental Protection (PADEP) or applicable county conservation district, contractors, the landowner, appropriate municipal officials, and the plan preparer must be invited to this meeting at least 7 days in advance.

Construction Sequence

1. Grade surface to finished grade elevations as soon as practicable following completion of pipe installation.

2. Install post construction BMPs after completion of pipeline construction:

Infiltration Berm

1. Install temporary sediment and erosion control BMPs as per the Pennsylvania Erosion and Sediment Pollution Control Program Manual.
2. Install orange construction fencing around the ponding area of the infiltration berm as shown on the PCSM Plan drawings. Complete site grading and stabilize within the limit of disturbance except where the infiltration berm will be constructed and the extent of the ponding area; make every effort to minimize berm footprint and necessary zone of disturbance (including both removal of existing vegetation and disturbance of empty soil) in order to maximize infiltration. If equipment must travel through the ponding area, timber matting shall be placed to minimize compaction, and equipment traffic shall be minimized.
3. Lightly scarify the soil in the area of the proposed berm before delivering soil to site.
4. Bring in fill material to make up the major portion of the berm. Soil should be added in 8-inch lifts and compacted after each addition according to design specifications. The slope and shape of the berm should be graded out as soil is added. This is a critical step of the sequence which requires oversight by a licensed professional.

5. Protect the surface ponding area at the base of the berm from compaction. This is a critical step of the sequence which requires oversight by a licensed professional.
6. Complete final grading of the berm after the top layer of soil is added. Tamp soil down lightly and smooth sides of the berm. The crest and base of the berm should be at level grade. This is a critical step of the sequence which requires oversight by a licensed professional.
7. Plant berm with turf, meadow plants, shrubs or trees, as desired.
8. Mulch planted and disturbed areas with compost mulch to prevent erosion while plants become established.

Soil Amendment and Restoration

1. Grade surface to finished grade elevations as soon as practicable following completion of pipe installation.
2. In the designated soil amendment area, till the ground and mix in the compost at a ratio of 2:1 (soil:compost) to a depth of 24 inches. This is a critical step of the sequence which requires oversight by a licensed professional.
3. Immediately seed and mulch disturbed areas once final grade is established in accordance with the permanent seeding schedule.
4. Maintain erosion and sedimentation control devices until site work is complete and a uniform 70% perennial vegetative cover is established.

Level Spreader

1. The uphill development shall be stabilized before diverting runoff to any dispersing flow techniques.
2. All contributing stormwater elements (infiltration berms, inlets, outlet control structures, pipes, etc.) shall be installed prior to installation of the level spreader.
3. HDPE pipe shall be installed along a contour uphill of the level spreader, with care taken to construct a slightly sloped bottom.
4. If necessary, install erosion control matting along the length of the level spreader and to a distance downhill, as specified by the manufacturer/supplier.
5. A berm shall be installed along the outlet of the HDPE pipe to ensure stormwater runoff is routed to the level spreader.

Permanent Seeding

Site preparation and establishment of permanent cover will be conducted according to the following guidelines:

RECOMMENDED SEED MIXTURES			
MIXTURE NO.	**SPECIES**	**SEEDING RATES – PLS (1)**	
		MOST SITES	ADVERSE SITES
1 (2)	spring oats (spring), or 64 96	64	96

RECOMMENDED SEED MIXTURES			
MIXTURE NO.	**SPECIES**	**SEEDING RATES – PLS (1)**	
		MOST SITES	ADVERSE SITES
	annual ryegrass (spring or fall), or	10	15
	winter wheat (fall), or	90	120
	winter rye (fall)	56	112
2 (3)	tall fescue, or 75	60	75
	fine fescue, or 40	35	40
	kentucky bluegrass, plus 25 30	25	30
	redtop(4), or	3	3
	perennial ryegrass	15	20
3	birdsfoot trefoil, plus 6 10	6	10
	tall fescue	30	35
4	birdsfoot trefoil, plus	6	10
	reed canarygrass	10	15
5 (5)	Big Bluestem, plus	10	15
	tall fescue, or	20	25
	perennial ryegrass	20	25
6 (5,6)	Big Bluestem, plus	10	15
	annual ryegrass	20	25
7 (5)	birdsfoot trefoil, plus	20	30
	Big Bluestem, plus	20	30
	tall fescue	20	25
8	flatpea, plus	20	30
	tall fescue, or	20	30
	perennial ryegrass	20	25
9 (7)	serecia lespedeza, plus	10	20
	tall fescue, plus	20	25
	redtop(4)	3	3
10	tall fescue, plus	40	60
	fine fescue	10	15
11	deertongue, plus	15	20
	birdsfoot trefoil	6	10
12(8)	switchgrass, or	15	20
	big bluestem, plus	15	20
	birdsfoot trefoil	6	10
13	orchardgrass, or	20	30
	smooth bromegrass, plus	25	35
	birdsfoot trefoil	6	10

1. Pure live seed (pls) is the product of the percentage of pure seed times percentage germination divided by 100. For example, to secure the actual planting rate for switchgrass, divide 12 pounds pls shown on the seed tag. Thus, if the pls content of a given seed lot is 35 percent, divide 12 pls by 0.35 to obtain 34.3 pounds of seed required to plant one-acre. All mixtures in this table are shown in terms of pls.

2. If high-quality seed is used, for most sites seed spring oats at a rate of two bushels per acre, winter wheat at 11.5 bushels per acre, and winter rye at one bushel per acre. If germination is below 90 percent, increase these suggested seeding rates by 0.5 bushel per acre.

3. This mixture is suitable for frequent mowing. Do not cut shorter than 4 inches.

4. Keep seeding rate to that recommended in table. These species have many seeds per pound and are very competitive. To seed small quantities of small seeds such as weeping lovegrass and redtop, dilute with dry sawdust, sand, rice hulls, buckwheat hulls, etc.

5. Seed mixtures containing crown vetch should not be used in areas adjacent to wetlands or stream channels due to the invasive nature of this species.

6. Use for highway slopes and similar sites where the desired species after establishment is Big Bluestem.

7. Use only in extreme southeastern or extreme southwestern PA. Serecia lespedeza is not well adapted to most of PA.

8. Do not mow shorter than 9 to 10 inches.

9. If liming, fertilization, and preparation of seedbed are properly done and if care is taken to drill and cover the seed (or mulch applied), the rate for "most sites" should suffice. However, on eroded or coarse and poorly prepared seedbeds, particularly if the soil is very acidic or infertile, the rate for "adverse sites" should be used.

PENNDOT FORMULA B				
Seeding Rate	3 lbs. per 1,000 square feet			
Species	**% by Weight**	**Purity %**	**Minimum % Germination**	**Maximum % Weed Seed**
Kentucky Bluegrass	50	98	80	0.20
Perennial Rye	20	98	90	0.15
Red Fescue	30	98	85	0.15

Liming Rates

Minimum 6 tons per acre at 100% effective neutralizing value (% ENV), unless the soil test determines that a lesser amount is needed. To determine the actual amount of regular lime to apply, divide the amount called for by the soil test by the % ENV for the product used. For example, if 6 tons per acre is needed and the %ENV for the lime used is 88%, divide 6 by 0.88 resulting in 6.8 tons needing to be applied. For dolomitic lime, which

has a significant amount of magnesium in it, divide the amount called for by the soil test by the % calcium carbonate equivalent (% CCE) listed for the product instead of the % ENV. The % CCE may be above 100% which accounts for the fact that magnesium has a greater effect per pound than the calcium in regular lime. Note: When a soil test requires more than 8,000 pounds of lime per acre, the lime must be mixed into the top 6 inches of soil.

Fertilization Rates

Apply 10-20-20 at 600 pounds/acre, if top dressed or 1,000 pounds/ac, if incorporated, unless the soil test determines that the rate can be less than these minimums.

SOIL AMENDMENT APPLICATION RATE EQUIVALENTS				
Soil Amendment	Per Acre	Per 1,000 sq. ft.	Per 1,000 sq. yds.	
AGRICULTURAL LIME	6 TONS	240 LBS.	240 LBS.	or as per soil test; may not be required in agricultural fields
10-20-20 FERTILIZER	1,000 LBS.	25 LBS.	25 LBS.	or as per soil test; may not be required in agricultural fields

SITE CONDITIONS	NURSE CROP	SEED MIXTURE (SELECT ONE MIXTURE)
SLOPES AND BANKS (NOT MOWED)		
WELL-DRAINED	1 PLUS	3, 5, 8, OR 12 (1)
VARIABLE DRAINAGE	1 PLUS	3 OR 7
SLOPES AND BANKS (MOWED)	1 PLUS	2 OR 10
WELL-DRAINED		
SLOPES AND BANKS (GRAZED/HAY)	1 PLUS	2,3, OR 13
WELL-DRAINED		
GULLIES AND ERODED AREAS	1 PLUS	3, 5, 7, OR 12 (1)
EROSION CONTROL FACILITIES (BMPS)		
SOD WATERWAYS, SPILLWAYS, FREQUENT WATER FLOW AREAS	1 PLUS	2, 3, OR 4
DRAINAGE DITCHES		
SHALLOW, LESS THAN THREE FEET DEEP	1 PLUS	2, 3, OR 4
DEEP, NOT MOWED	1 PLUS	5 OR 7
POND BANKS, DIKES, LEVEES, DAMS, DIVERSION CHANNELS, AND OCCASIONAL WATER FLOW AREAS		
MOWED AREAS	1 PLUS	2 OR 3
NON-MOWED AREAS	1 PLUS	5 OR 7
FOR HAY OR SILAGE ON DIVERSION CHANNELS AND OCCASIONAL WATER FLOW AREAS	1 PLUS	3 OR 13
HIGHWAYS (2)		
NON-MOWED AREAS		
	1 PLUS	5, 7, 8, 9, OR 10
WELL-DRAINED	1 PLUS	3 OR 7
VARIABLE DRAINED	1 PLUS	3 OR 9

SITE CONDITIONS	NURSE CROP	SEED MIXTURE (SELECT ONE MIXTURE)
POORLY DRAINED AREAS MOWED SEVERAL TIMES PER YEAR	1 PLUS	2, 3, OR 10
UTILITY ROW WELL-DRAINED VARIABLE DRAINED WELL-DRAINED AREAS FOR GRAZING/HAY	 1 PLUS 1 PLUS 1 PLUS	 5, 8, OR 12 (1) 3 OR 7 2, 3, OR 13
EFFLUENT DISPOSAL AREAS	1 PLUS	3 OR 4
SANITARY LANDFILLS	1 PLUS	3, 5, 7, 11 (1), OR 12 (1)
SURFACE MINES SPOILS, MINE WASTES, FLY ASH, SLAG, SETTLING BASIN RESIDUES AND OTHER SEVERELY DISTURBED AREAS (LIME TO SOIL TEST) SEVERELY DISTURBED AREAS FOR GRAZING/HAY	 1 PLUS 1 PLUS	 3, 4, 5, 7, 8, 9,11 (1) OR 12(1) 3 OR 13

a. For seed mixtures 11 and 12, only use spring oats or weeping lovegrass (included in mix) as nurse crop.

b. Contact PennDOT district roadside specialist for specific suggestions on treatment techniques and management practices.

Temporary Seeding

Temporary grass cover will be established where soil stockpiles are exposed for a period greater than 4 days. The seed mixture for temporary cover will consist of 100% annual ryegrass. Seed will be applied at the rate of 40 pounds per acre or as recommended by a local recognized seed supplier approved by the Owner's representative. Prior to seeding, apply 1 ton of agricultural grade limestone per acre plus 10-10-10 fertilizer at the rate of 500 pounds per acre and work into the soil.

Mulching

The purpose of mulch is to reduce runoff and erosion, prevent surface compaction or crusting, conserve moisture, aid in establishing plant cover, and control weeds. Mulch will be applied on any area subject to erosion or that has unfavorable conditions for plant establishment and growth. The practice may be used alone or in conjunction with other structural and vegetative conservation practices such as waterways, ponds, sedimentation traps, or critical area planting. On sediment-producing areas where the period of exposure is less than two (2) months, mulch materials will be applied according to the following guidelines:

1. Straw mulch will be applied at the rate of 3 tons per acre. Chemically treated or salted straw is not acceptable as mulch.

2. Straw mulch will be anchored immediately after application by at least one of the following methods:

    a. "Crimped" into the soil using tractor-drawn equipment (straight-bladed coulter or similar).

This method is limited to slopes no steeper than 3:1. Machinery should be operated on the contour. (Crimping of hay or straw by running it over with tracked machinery is not recommended.)

b. Asphalt, either emulsified or cut-back, containing no solvents or other diluting agents toxic to plant or animal life, uniformly applied at the rate of 31 gallons per 1,000 square feet.

c. Synthetic binders (chemical binders) may be used as recommended by the manufacturer to anchor mulch provided that sufficient documentation is provided to show that it is non-toxic to native plant and animal species.

d. Lightweight plastic, fiber, or paper nets may be stapled over the mulch according to the manufacturer's recommendations.

Mulched areas will be checked periodically and after each runoff event (e.g., rain, snowmelt, etc.) for damage until the desired purpose of the mulching is achieved. Damaged portions of the mulch or tie-down material will be repaired upon discovery.

4.2 MATERIAL RECYCLING AND DISPOSAL

The operator will remove from the site, recycle, or dispose of all building materials and wastes in accordance with PADEP's solid waste management regulations at 25 Pennsylvania Code 260.1 et seq., 271.1 et seq., and 287.1 et seq. The contractor will not illegally bury, dump, or discharge building material or wastes at the site. Excess material brought into the site areas to facilitate construction access will be completely removed prior to rough grading and final surface stabilization. Expected construction wastes resulting from installation of post-construction stormwater management BMPs will consist of packaging material, pipe cuttings from underdrains and PCSM BMP outlet structures, excavated soil to construct PCSM BMPs, and sediment cleaned from PCSM BMPs during maintenance and inspections. Pipe cuttings and packaging from materials brought on site will be disposed of by a licensed hauler. Soil excavated during construction of PCSM BMPs will be recycled onsite as fill material or disposed of off-site. Sediment removed from PCSM BMPs during onsite maintenance and inspection activities will be disposed of off-site. In cases where disposal is necessary, waste materials will be disposed of at an approved PADEP waste site.

4.3 THERMAL IMPACTS

Thermal impacts are most commonly associated with urbanization (i.e., increased impervious surfaces) that results in heated stormwater runoff flowing into receiving waters where it mixes, and potentially increases the base temperature of the surface water in streams. However, another contributing factor for stream temperature is solar exposure (radiant energy input) to the surface water, typically ponded, standing waters. The amount of heat transferred, and the degree of thermal pollution is of importance for fisheries management and the ecological integrity of receiving waters. Among the attributes that determine the contribution of solar energy to

thermal impacts are the presence of riparian vegetation, as well as stream width, depth, flow regime (perennial, intermittent, ephemeral), and orientation.

At locations where the addition/creation of a permanent compacted aggregate surface is proposed, An infiltration berm, infiltration trench, slow release bmp and/or soil amendments will be implemented as a PCSM BMP to mitigate associated increases in runoff volume. No thermal impacts from aggregate surfaces are anticipated as the infiltration berms or soil ammendments will capture runoff and allow infiltration time prior to downstream discharge, thereby mitigating any possible thermal impact which may exist. Thermal impacts associated with gravel areas are not anticipated as a result of subsurface infiltration and a detailed analysis is provided below.

Block valve	Designated Use	Existing use	Site Specific Thermal Impact Analysis
Fairview Road	HQ-TSF	-	Potential pollution to surface waters from thermal impacts will be minimized by minimizing clearing and retaining existing vegetation where possible during construction. Following construction, permanent seeding will occur as soon as practicable to facilitate vegetative growth. Impervious surfaces have been minimized to the maximum extent possible and runoff is directed to vegetated areas and infiltration berms to cool runoff prior to discharge. Infiltration berms are proposed to infiltrate runoff which would recharge the groundwater and allow for cooling. Ponded water can result in significant thermal impacts. The infiltration berms have been designed to dewater in less than 72 hours, so water will not pond for a significant period of time. A direct surface outlet is not proposed to the receiving surface water.The surface water flows across a mild slope approximately 400 feet through riparian area to the nearest receiving water. The site runoff does not impact the chemistry and biology of the receiving water and it's designation as a high quality water.
East Lincoln Highway	TSF	-	Potential pollution to surface waters from thermal impacts will be minimized by minimizing clearing and retaining existing vegetation where possible during construction. Following construction, permanent seeding will occur as soon as practicable to facilitate vegetative growth. Impervious surfaces have been minimized to the maximum extent possible and runoff is directed to vegetated areas and an infiltration berm to cool runoff prior to discharge. The infiltration berm will infiltrate runoff which would recharge the groundwater and allow for cooling. Ponded water can result in significant thermal impacts. The infiltration berm has been designed to dewater in less than 72 hours, so water will not pond for a significant period of time. A direct surface outlet is not proposed to the receiving surface water. Runoff will have the opportunity to infiltrate rather than discharging directly to a nearby surface water.
		-	Potential pollution to surface waters from thermal impacts will be minimized by minimizing clearing and retaining

Block valve	Designated Use	Existing use	Site Specific Thermal Impact Analysis
Boot Road	HQ-CWF		existing vegetation where possible during construction. Following construction, permanent seeding will occur as soon as practicable to facilitate vegetative growth. Impervious surfaces have been minimized to the maximum extent possible and runoff is directed to vegetated areas and an infiltration berm to cool runoff prior to discharge. The infiltration berm will infiltrate runoff which would recharge the groundwater and allow for cooling. Ponded water can result in significant thermal impacts. The infiltration berm has been designed to dewater in less than 72 hours, so water will not pond for a significant period of time. A direct surface outlet is not proposed to the receiving surface water. The surface water flows across a very mild slope approximately 200 feet through riparian area to the nearest receiving water. Runoff will have the opportunity to infiltrate rather than discharging directly to a nearby surface water, thereby maintaining the cold water habitat.
S. Pennell Road	TSF	-	Potential pollution to surface waters from thermal impacts will be minimized by minimizing clearing and retaining existing vegetation where possible during construction. Following construction, permanent seeding will occur as soon as practicable to facilitate vegetative growth. Impervious surfaces have been minimized to the maximum extent possible and runoff is directed to vegetated areas and infiltration berms to cool runoff prior to discharge. Infiltration berms are proposed to infiltrate runoff which would recharge the groundwater and allow for cooling. Ponded water can result in significant thermal impacts. The infiltration berms have been designed to dewater in less than 72 hours, so water will not pond for a significant period of time. A direct surface outlet is not proposed to the receiving surface water. The surface water flows across a mild slope directly to the nearest receiving water.

4.4 RIPARIAN FOREST BUFFERS

Pennsylvania Pipeline Project - Riparian Forest Buffer Waiver Request

The Pennsylvania Pipeline Project qualifies for an exception of the riparian forest buffer requirement under Chapter 102.14(d)(1)(ix) for areas within the Chapter 105 permit area. Existing riparian forest buffers within the project area are identified on the E&S plan drawings in Attachment 2 of the E&S Plan.

In addition to the exception, we are requesting a waiver under 102.14(d)(2)(ii) for areas within 150' of surface waters that are outside of the Chapter 105 permit area. A detailed riparian buffer waiver request has also been prepared and is included as an attachment to the ESCGP-2 Notice of Intent.

Demonstration of Waiver Necessity

A riparian forest buffer waiver is necessary to complete the intended scope of the pipeline project. The project involves the installation of approximately two parallel pipelines within a 306-mile, 50-foot-wide ROW from Houston, Washington County, PA to SPLP's Marcus Hook facility in Delaware County, PA with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline would be installed within the ROW from Houston to Marcus Hook (306 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, PA to the Marcus Hook facility, paralleling the initial line for approximately 255 miles. Spreads 3, 4, and 5 (South Central Region) of this project are cross through Blair, Huntingdon, Juniata, Perry, Cumberland, York, Dauphin, Lebanon, Lancaster, and Berks Counties, PA. Due to the linear nature of the project and the surrounding topography, riparian forest buffers could not be avoided altogether.

Alternatives Analysis

Impacts to environmental resources, including riparian forest buffers, were evaluated during the pipeline routing phase of the project. Field teams were deployed to evaluate alternate routes based on environmental and constructability constraints. The final route that was selected minimizes environmental impacts to the maximum extent practicable while still maintaining the project's overall constructability and ensuring a safe working environment while also taking landowner constraints into consideration. Additionally, several variations of horizontal direction drill profiles were evaluated to minimize pullback areas, additional workspaces, and overall disturbance within riparian forest buffers. Permanent features, such as access roads and block valves, were evaluated to locate the features outside of the riparian forest buffer, where possible.

Demonstration of Minimizing Impacts

All disturbance activities, including those which impact riparian forest buffers, have been reduced to the maximum extent practicable. The LOD has been reduced to 50 feet wide at all stream crossings within the riparian forest buffer area where possible adjacent to the stream area required for crossing and construction. In areas where it is not practicable to reduce the LOD throughout the entire extent of the riparian forest buffer, the LOD has been reduced to 50 feet wide within 10 feet of the stream banks to limit the proximity of the work areas as per the stream crossing detail from the 2012 PADEP Erosion and Sediment Pollution Control Program Manual. The operations within the LOD near stream crossings typically includes a topsoil stockpile, a stockpile for pipe trench excavation material, a pipe trench, a travel lane, a work area for equipment operation and pipeline welding outside the trench, and an area to install the erosion control BMPs. In addition, site conditions such as steep slopes, varying depths of topsoil, and other on-site conditions limit the amount of work area. Reducing the LOD to a greater extent could potentially result in unsafe working conditions and would hinder the ability to complete the stream crossing within the required time frame of 24 hours or less. Workspaces that provide additional space for stream crossing activities have been placed outside of riparian forest buffers where possible. The post construction stormwater management infiltration berms and trenches are not located within riparian forested buffers.

Meeting Requirements of Chapter 102

All other aspects of Chapter 102 are being met. The project's E&SC Plan and SR/Post-Construction Stormwater Management Plan have been designed in accordance with Chapter 102. In accordance with Chapter 102, and E&S plan has been developed to minimize the sediment entering the buffer areas. The post construction stormwater management plan has been design to control runoff rate and volume which may be discharge through riparian buffer areas.

4.5 INSPECTION AND MAINTENANCE PROCEDURES

Long-term maintenance of the pipeline ROW will include periodic visual inspections for sufficient vegetative growth and cover. Insufficient vegetative cover is defined as any area not achieving a uniform 70-percent perennial vegetative cover. Bare spots and areas with insufficient vegetative cover will be reseeded and mulched within 24 hours of discovery. The ROW will be inspected for signs of erosion, especially on steep slopes. Corrective measures will be taken, as needed. If there is evidence of trench settling, the area will be regraded to maintain pre-construction drainage patterns, mulched, and seeded. A written report is required for each inspection and for each repair or maintenance activity, and the report should specify how to access the site. SPLP is responsible for maintaining the ROW under the provisions of this permit.

Permanent proposed access roads and valve pads will be constructed as part of the project. These access roads will remain as a permanent gravel drive after construction is complete. The access roads will be inspected periodically, and aggregate will be applied to the permanent access roads as needed to maintain an adequate thickness.

Inspection and maintenance procedures for permanent post-construction stormwater management facilities and stormwater conveyance BMPs are summarized below. If any post-construction stormwater management facilities are constructed prior to stabilization of upslope contributory drainage areas, inspections shall occur weekly and after runoff events until the surrounding area achieves stabilization. Sites located within karst terrain require more frequent long-term inspections, as specified in the Sinkhole Repair Plan in Attachment 2.

Infiltration Berm

- The infiltration berm shall be inspected at least 4 times per year to ensure it is infiltrating properly and not clogged with sediment.
- Monitor drawdown time after the first major storm event. The berm shall dewater within a maximum of 72 hours. If the berm is not infiltrating within the specified timeframe, amend the soils within the ponding area of the berm (see Soil Amendment detail in plans).
- Vegetation over the berm shall be maintained as necessary, which may require annual mulching. Routinely remove accumulated debris and invasive plants as needed.

- Inspect for signs of flow channelization and restore level gradient immediately after any deficiencies are observed.

Diversion Berm

- Inspections to be done annually and within 48 hours after every major storm event (> 1 inch rainfall depth).
- Maintain turf grass and other vegetation by mowing and re-mulching.
- Routinely remove accumulated trash and debris.
- Remove invasive plants as needed.
- Inspect for signs of flow channelization; restore level gradient immediately after deficiencies are observed.

Soil Amendment and Restoration

- The soil restoration process may need to be repeated over time, due to compaction by use and/or settling.
- Soil amendment areas shall be inspected at least 4 times per year for signs of compaction. To remedy compaction, till the soil to a depth of 24 inches and mix in compost at a ratio of 2:1 (soil:compost).

Level Spreader

- Inspections to be done annually and within 48 hours after every major storm event (> 1 inch rainfall depth).
- The receiving land shall be immediately restored to design conditions after any disturbance. Vegetated areas shall be seeded and blanketed.
- It is critical that even sheet flow conditions are sustained throughout the life of the level spreader, as their effectiveness can deteriorate due to lack of maintenance, inadequate design/location, and poor vegetation cover.
    - The area below the level spreader shall be inspected for clogging, density of vegetation, damage by foot or vehicular traffic, excessive accumulations, and channelization. Inspections shall be made on a quarterly basis for the first two years following installation, and then on a semiannual basis thereafter. Inspections shall also be made after every storm event greater than 1-inch.
    - Sediment and debris shall be routinely removed (but never less than semiannually), or upon observation, when buildup occurs in the clean outs. Regrading and reseeding may be necessary in the areas below the level spreader. Regrading may also be required when pools of standing water are observed along the slope. (In no case should standing water be allowed for longer than 72 hours).
    - Maintaining a vigorous vegetative cover on the areas below the level spreader is critical for maximizing pollutant removal efficiency and erosion prevention. If vegetative cover is not fully

established within the designated time, it may need to be replaced with an alternative species. (It is standard practice to contractually require the contractor to replace dead vegetation.) Unwanted or invasive growth shall be removed on an annual basis. Biweekly inspections are recommended for at least the first growing season, or until the vegetation is permanently established. Once the vegetation is established, inspections of health, diversity, and density shall be performed at least twice a year, during both the growing and non-growing season. Vegetative cover shall be sustained at 85% and replaced if damage greater than 50% is observed.

Diversion Berm

- Inspections to be done annually and within 48 hours after every major storm event (> 1 inch rainfall depth).
- Maintain turf grass and other vegetation by mowing and re-mulching.
- Routinely remove accumulated trash and debris.
- Remove invasive plants as needed.
- Inspect for signs of flow channelization; restore level gradient immediately after deficiencies are observed.

Channel

- Inspections to be done annually and within 48 hours after every major storm event (> 1 inch rainfall depth).
    - Inspect and correct erosions problems, damage to vegetation, and sediment and debris accumulation (address when > 3 inches at any spot or covering vegetation).
    - For vegetated channels, inspect vegetation on side slopes for erosion and formation of rills or gullies, correct as needed.
    - Inspect for pools of standing water, dewater and discharge to an approved location and restore to design grade.
    - For vegetated channels, mow and trim vegetation to ensure safety, aesthetics, proper swale operation, or to suppress weeds and invasive vegetation; dispose of cuttings in a local composting facility; mow only when channel is dry to avoid rutting.
    - Inspect for litter; remove prior to mowing.
    - Inspect for uniformity is cross-section and longitudinal slope, correct as needed.
    - Inspect channel inlet (curb cuts, pipes, etc.) and outlet for signs of erosion or blockage, correct as needed.

- Replace any displaced riprap for riprap lined channels.

4.6 ANTIDEGRADATION REQUIREMENTS

Portions of the earth disturbance activities associated with the SPPP will be located within a HQ/EV watershed. A combination of non-discharge alternatives and the use of ABACT BMPs will be implemented to protect and maintain the existing water quality of the receiving waters..

Non-discharge alternatives were evaluated to minimize accelerated E&S and achieve zero net change in runoff between the pre and post-construction conditions. Non–discharge alternatives exist when the existing land use is revegetated and grade is restored therefore no increase in runoff rate or volume from pre to post construction results. Other non-discharge alternatives implemented are limiting and minimizing the extent of disturbed areas and limiting the extent and duration of disturbance (phasing and sequencing) then stabilizing disturbed areas as soon as practicable. ABACT BMPs will be used onsite to protect and maintain the existing water quality of receiving waters also in areas where non-discharge alternatives exist.

Where non-discharge alternatives do not exist, ABACT BMPs will be used onsite to protect and maintain the quality of the receiving HQ and EV resources. The below table addresses the antidegradation analysis for the specific sites with High Quality, Exceptional Value and siltation impaired waters.

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
Fairview Road	HQ-TSF	-	Fairview Road block valve is located within a special protection watershed. The project site was designed to minimize the total amount of impervious area. The impervious area for the Fairview Road block valve was limited to the amount that is required to safely construct and operate the block valve. In addition, the previously proposed gravel turn-around was eliminated, and replaced with a grass area. Non-discharge alternatives were analyzed for this block valve site. The location of the Fairview Road block valve site was evaluated by ASME B31.4 Valve Spacing 434.15.2(e) which states that mainline valves should not be more than 7.5 miles apart. The valve sites were located in such a way that they avoided environmentally sensitive areas (such as wetlands and floodplains), were close to an existing road, and close to power. Land owner preference was also accounted for while locating the block valve sites. Once all of these factors were

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			taken into account, several block valve sites, including Fairview Road, were located in special protection watersheds. Non-discharge alternatives were also considered when determining the type of BMP proposed. Fairview Road block valve site utilizes infiltration berms to manage stormwater. Stormwater runoff is infiltrated to the maximum extent possible. Stormwater runoff is spread out to flow through areas that have been restored to meadow conditions, to infiltration berms, or to undisturbed area. There will not be an increase in stormwater runoff rate or volume to prevent the physical degradation of the receiving water, such as scour, and stream bank destabilization. Stormwater runoff volume is not increasing throughout post-construction, and any post-construction stormwater discharge is managed so that it will not degrade the physical, chemical or biological characteristics of the receiving stream. Runoff from the site will be managed by two downslope infiltration berms. Ponded runoff will be temporarily stored upslope of the berm until it infiltrates and filters through the soil media. Due to the design of the berms, which maintain a constant elevation through the entire berm length, the stormwater runoff will be released in sheet flow down a stabilized slope, without causing erosion, rather than concentrating the flow. Filtration through the existing vegetation and soil is an efficient way to remove suspended stormwater pollutants such as sediment, as the suspended particles are physically filtered from the stormwater as it flows through the vegetation and percolates into the soil. The extent of the disturbed area will be minimized, and the duration of disturbance will be minimized by stabilizing disturbed areas as soon as practicable. Cut and fill for the project site has been minimized. Where possible based on the criteria listed above, sites were located in areas with shallow slopes to minimize the amount of cut and fill required. At Fairview Road block valve site, the grading was done to tie into existing contours, which did lead to some cut and fill requirements. This was done so that the block valve site was graded towards the natural slope. No direct discharge to surface water occurs at the site. The site will be restored promptly with proper vegetative cover techniques. Antidegradation requirements for the special protection watershed are met because the post-construction stormwater

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			infiltration volume equals or exceeds the pre-construction stormwater infiltration volume, and post-construction stormwater discharge is pretreated via infiltration berms. The runoff is managed so that it will not degrade the physical, chemical, or biological characteristics of the receiving stream.
East Lincoln Highway	CWF (siltation impaired)	-	East Lincoln Highway block valve is located within a siltation impaired watershed. The project site was designed to minimize the total amount of impervious area. The impervious area for the East Lincoln Highway valve was limited to the amount that is required to safely construct and operate the block valve. In addition, the previously proposed gravel turn-around was eliminated, and replaced with a grass area. Non-discharge alternatives were analyzed for this block valve site. The location of the East Lincoln Highway block valve site was evaluated by ASME B31.4 Valve Spacing 434.15.2(e) which states that mainline valves should not be more than 7.5 miles apart. The valve sites were located in such a way that they avoided environmentally sensitive areas (such as wetlands and floodplains), were close to an existing road, and close to power. Land owner preference was also accounted for while locating the block valve sites. Once all of these factors were taken into account, several block valve sites, including East Lincoln Highway, were located in special protection or siltation impaired watersheds. Non-discharge alternatives were also considered when determining the type of BMP proposed. East Lincoln Highway block valve site utilizes an infiltration berm to manage stormwater. Stormwater runoff is infiltrated to the maximum extent possible. Stormwater runoff is spread out to flow through areas that have been restored to meadow conditions, to an infiltration berm, or to undisturbed area. There will not be an increase in stormwater runoff rate or volume to prevent the physical degradation of the receiving water, such as scour, and stream bank destabilization. Stormwater runoff volume is not increasing throughout post-construction, and any post-construction stormwater discharge is managed so that it will not degrade the physical, chemical or biological characteristics of the receiving stream. Runoff from the site will be managed by a downslope infiltration berm. Ponded runoff will be temporarily stored upslope of the berm until it infiltrates and filters through the soil media. Due to the design of the berm, which maintains a

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			constant elevation through the entire berm length, the stormwater runoff will be released in sheet flow down a stabilized slope, without causing erosion, rather than concentrating the flow. Filtration through the existing vegetation and soil is an efficient way to remove suspended stormwater pollutants such as sediment, as the suspended particles are physically filtered from the stormwater as it flows through the vegetation and percolates into the soil. The extent of the disturbed area will be minimized, and the duration of disturbance will be minimized by stabilizing disturbed areas as soon as practicable. Cut and fill for the project site has been minimized. Where possible based on the criteria listed above, sites were located in areas with shallow slopes to minimize the amount of cut and fill required. There is minimal cut and fill required at the East Lincoln Highway block valve site. All of the block valve sites were graded towards the natural slope. No direct discharge to surface water occurs at the site. The site will be restored promptly with proper vegetative cover techniques. Antidegradation requirements for the special protection watershed are met because the post-construction stormwater infiltration volume equals or exceeds the pre-construction stormwater infiltration volume, and post-construction stormwater discharge is pretreated via infiltration berms. The runoff is managed so that it will not degrade the physical, chemical, or biological characteristics of the receiving stream.
Boot Road	HQ-TSF	-	Boot Road block valve is located within a high quality watershed. The project site was designed to minimize the total amount of impervious area. The impervious area for the Boot Road block valve was limited to the amount that is required to safely construct and operate the block valve. In addition, the previously proposed gravel turn-around was eliminated, and replaced with a grass area. Non-discharge alternatives were analyzed for this block valve site. The location of the Boot Road block valve site was evaluated by ASME B31.4 Valve Spacing 434.15.2(e) which states that mainline valves should not be more than 7.5 miles apart. The valve sites were located in such a way that they avoided environmentally sensitive areas (such as wetlands and floodplains), were close to an existing road, and close to power. Land owner preference was also accounted for while locating the block valve sites. Once all of these factors were

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			taken into account, several block valve sites, including East Lincoln Highway, were located in special protection or siltation impaired watersheds. Non-discharge alternatives were also considered when determining the type of BMP proposed. Boot Road block valve site utilizes an infiltration berm to manage stormwater. Stormwater runoff is infiltrated to the maximum extent possible. Stormwater runoff is spread out to flow through areas that have been restored to meadow conditions, to an infiltration berm, or to undisturbed area. There will not be an increase in stormwater runoff rate or volume to prevent the physical degradation of the receiving water, such as scour, and stream bank destabilization. Stormwater runoff volume is not increasing throughout post-construction, and any post-construction stormwater discharge is managed so that it will not degrade the physical, chemical or biological characteristics of the receiving stream. Runoff from the site will be managed by a downslope infiltration berm. Ponded runoff will be temporarily stored upslope of the berm until it infiltrates and filters through the soil media. Due to the design of the berm, which maintains a constant elevation through the entire berm length, the stormwater runoff will be released in sheet flow down a stabilized slope, without causing erosion, rather than concentrating the flow. Filtration through the existing vegetation and soil is an efficient way to remove suspended stormwater pollutants such as sediment, as the suspended particles are physically filtered from the stormwater as it flows through the vegetation and percolates into the soil. The extent of the disturbed area will be minimized, and the duration of disturbance will be minimized by stabilizing disturbed areas as soon as practicable. Cut and fill for the project site has been minimized. Where possible based on the criteria listed above, sites were located in areas with shallow slopes to minimize the amount of cut and fill required. There is minimal cut and fill required at the Boot Road block valve site. All of the block valve sites were graded towards the natural slope. No direct discharge to surface water occurs at the site. The site will be restored promptly with proper vegetative cover techniques. Antidegradation requirements for the special protection watershed are met because the post-construction stormwater

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			infiltration volume equals or exceeds the pre-construction stormwater infiltration volume, and post-construction stormwater discharge is pretreated via infiltration berms. The runoff is managed so that it will not degrade the physical, chemical, or biological characteristics of the receiving stream.
S. Pennell Road	TSF (siltation impaired)	-	S. Pennell Road block valve is located within a siltation impaired watershed. The project site was designed to minimize the total amount of impervious area. The impervious area for the S. Pennell Road block valve was limited to the amount that is required to safely construct and operate the block valve. In addition, the previously proposed gravel turn-around was eliminated, and replaced with a grass area. Non-discharge alternatives were analyzed for this block valve site. The location of the S. Pennell Road block valve site was evaluated by ASME B31.4 Valve Spacing 434.15.2(e) which states that mainline valves should not be more than 7.5 miles apart. The valve sites were located in such a way that they avoided environmentally sensitive areas (such as wetlands and floodplains), were close to an existing road, and close to power. Land owner preference was also accounted for while locating the block valve sites. Once all of these factors were taken into account, several block valve sites, including S. Pennell Road, were located in special protection or siltation impaired watersheds. Non-discharge alternatives were also considered when determining the type of BMP proposed. S. Pennell Road block valve site utilizes an infiltration berm to manage stormwater. Stormwater runoff is infiltrated to the maximum extent possible. Stormwater runoff is spread out to flow through areas that have been restored to meadow conditions, to an infiltration berm, or to undisturbed area. There will not be an increase in stormwater runoff rate or volume to prevent the physical degradation of the receiving water, such as scour, and stream bank destabilization. Stormwater runoff volume is not increasing throughout post-construction, and any post-construction stormwater discharge is managed so that it will not degrade the physical, chemical or biological characteristics of the receiving stream. Runoff from the site will be managed by a downslope infiltration berm. Ponded runoff will be temporarily stored upslope of the berm until it infiltrates and filters through the soil media. Due to the design of the berm, which maintains a

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			constant elevation through the entire berm length, the stormwater runoff will be released in sheet flow down a stabilized slope, without causing erosion, rather than concentrating the flow. Filtration through the existing vegetation and soil is an efficient way to remove suspended stormwater pollutants such as sediment, as the suspended particles are physically filtered from the stormwater as it flows through the vegetation and percolates into the soil. The extent of the disturbed area will be minimized, and the duration of disturbance will be minimized by stabilizing disturbed areas as soon as practicable. Cut and fill for the project site has been minimized. Where possible based on the criteria listed above, sites were located in areas with shallow slopes to minimize the amount of cut and fill required. There is minimal cut and fill required at the S. Pennell Road block valve site. All of the block valve sites were graded towards the natural slope. No direct discharge to surface water occurs at the site. The site will be restored promptly with proper vegetative cover techniques. Antidegradation requirements for the special protection watershed are met because the post-construction stormwater infiltration volume equals or exceeds the pre-construction stormwater infiltration volume, and post-construction stormwater discharge is pretreated via infiltration berms. The runoff is managed so that it will not degrade the physical, chemical, or biological characteristics of the receiving stream.

4.7 STORMWATER RUNOFF ANALYSIS

Five new block valve locations are proposed for the PADEP Southeast Region portion of the PPP project. Two additional block valves are proposed at existing sites, Elverson Interchange and Eagle Station, and do not expand the current impervious footprint or require grading. Expansions at the existing pump station at Twin Oaks have been analyzed and are provided under separate cover. One of the five new block valve sites will be vegetated, so it will not require PCSM. Some of the block valve sites are also adjacent to existing Sunoco owned block valve sites which minimizes the new footprint for additional gravel area and access roads.

The access roads and gravel pads will remain as a permanent facility after pipeline construction is complete. The PCSM design was designed in accordance with §§102.8(g)(2) and 102.8(g)(3). Where feasible, the PCSM design aimed to achieve the applicable Act 167 Plan. Site-specific discussion relating to PCSM

design standards is included in the individual write-ups that accompany each set of calculations in Attachment 4.

Drainage area figures are provided as Attachment 4. Without BMPs, an increase in stormwater runoff rates and volume occurs in the watersheds as a result of the additional gravel installation for the 2-year 24-hour duration storm. Stormwater management BMPs have been designed to mitigate this difference. Construction details and calculation worksheets are also included in Attachments 3 and 4, respectively, of this report. There is no increase in the stormwater runoff rate for the 24-hour duration, 2-, 10-, 50-, and 100-year storm events as a result of the access road and valve site construction. The decrease in peak rate is calculated through the travel time/time of concentration adjustment taken from the PA Stormwater BMP Manual. The watershed analysis has been separated into detained and undetained areas for the drainage area. The time of concentration under post conditions has been increased for the detained volume stored by the PCSM BMPs. The undetained area time of concentration has not been adjusted for the bypass area. The time of concentration has been adjusted based on the amount of volume detained for each routed/evaluated storm. The extended travel time is essentially the residence time of the storage elements, found by dividing the total storage by the 2-year, 24-hour storm duration peak flow rate. This increased travel time can be added to the time of concentration of the area to account for the slowing effect of the volume-reducing BMPs. The increased detention time is then evaluated for a detained condition in the model. Stormwater runoff and rate calculations are provided in Attachment 4.

Flow Chart D from the PA Stormwater BMP Manual was used to ensure that water quality requirements are being met. All areas requiring post-construction stormwater management achieve Control Guideline 1 (CG-1) for volume control, which provides water quality control and stream channel protection as well as flood control prevention. At least 90% of the disturbed site area is controlled by a BMP. As a result, TSS and TP requirements are considered met. Worksheet 10 has been utilized to demonstrate use of specific nitrate prevention/reduction BMPs. The PCSM BMPs have been adequately selected, sized, and distributed to preserve the water quality of downstream receiving waters.

Karst Topography

The East Lincoln Highway block valve site is believed to be within a 1.5-mile radius of documented sinkholes or depressions (source: http://www.gis.dcnr.state.pa.us/maps/)

Due to the risks associated with constructing stormwater facilities within karst terrain, several principles were employed to reduce the risk of sinkholes while still making every attempt to infiltrate stormwater runoff. The following principles were considered in the design:

- Minimizing proposed impervious surfaces
- Maximizing the proposed loading ratios, with a goal of achieving a 3:1 loading ratio.
- Spreading stormwater runoff over a large area.
- Avoiding concentrating stormwater runoff.
- Conducting additional post construction inspection and maintenance.

Site-specific details are provided in the PCSM write-up which accompanies the East Lincoln Highway stormwater management calculations in Attachment 4. In addition, a Sinkhole Repair Plan is included in Attachment 2 in the event that a sinkhole develops onsite.

Loading Ratios

Access Road/Valve Site	Loading Ratio Analysis
Fairview Road	The maximum impervious loading ratio of 5:1 has been met. The impervious loading ratio for the site is 3.8:1. The maximum drainage area loading ratio of 8:1 has not been met. The drainage area loading ratio for the site is 25.8:1. . Although the detained drainage area to the PCSM BMP exceeds the recommended maximum impervious loading ratio, the other design considerations for infiltration BMPs beginning on page 15 in Appendix C of the PA Stormwater BMP Manual have been met (design considerations a, b, c, d, f, g, h, i, and j). Rather than serving as a rigid requirement, the PA Stormwater BMP Manual recommends loading ratios be used as a guideline for designing infiltration BMPs. The risk of exceeding the recommended loading ratios is that the PCSM BMP will not function as intended, or in the worst-case scenario, failure of the stormwater BMP. Failure of the proposed infiltration berm has been defined in the application as the inability to pond upslope of the berm, or inability of the berm to infiltrate within 72 hours. Based on sound engineering judgment by Robert Simcik, P.E. licensed in the state of PA, and the other design considerations in the PA Stormwater BMP Manual being met, it is not anticipated that the proposed berm will fail as a result of the designed loading ratios. Runoff from the impervious area and upslope contributory drainage area will be dispersed over a shallow infiltration berm. The infiltration berm will be inspected regularly (at least 4 times per year) to ensure that it is not clogging with sediment, dewatering too slowly, or being washed out by large rain events from the contributory drainage area. In the event that an inspection shows evidence that the berms are not functioning properly, one of the ways to remedy the problem would be to construct upslope diversion. A permit modification would need to be filed prior to constructing upslope diversion.
East Lincoln Highway	The maximum impervious loading ratio of 5:1 has been met. The impervious loading ratio for the site is 1.5:1.

	The maximum drainage area loading ratio of 8:1 has not been met. The drainage area loading ratio for the site is 13.4:1. Although the detained drainage area to the PCSM BMP exceeds the recommended maximum impervious loading ratio, the other design considerations for infiltration BMPs beginning on page 15 in Appendix C of the PA Stormwater BMP Manual have been met (design considerations a, b, c, d, f, g, h, i, and j). Rather than serving as a rigid requirement, the PA Stormwater BMP Manual recommends loading ratios be used as a guideline for designing infiltration BMPs. The risk of exceeding the recommended loading ratios is that the PCSM BMP will not function as intended, or in the worst-case scenario, failure of the stormwater BMP. Failure of the proposed infiltration berm has been defined in the application as the inability to pond upslope of the berm, or inability of the berm to infiltrate within 72 hours. Based on sound engineering judgment by Robert Simcik, P.E. licensed in the state of PA, and the other design considerations in the PA Stormwater BMP Manual being met, it is not anticipated that the proposed berm will fail as a result of the designed loading ratios. Runoff from the impervious area and upslope contributory drainage area will be dispersed over a shallow infiltration berm. The infiltration berm will be inspected regularly (at least 4 times per year) to ensure that it is not clogging with sediment, dewatering too slowly, or being washed out by large rain events from the contributory drainage area. In the event that an inspection shows evidence that the berms are not functioning properly, one of the ways to remedy the problem would be to construct upslope diversion. A permit modification would need to be filed prior to constructing upslope diversion.
Boot Road	The maximum impervious loading ratio of 5:1 has been met. The impervious loading ratio for the site is 2.8:1. The maximum Drainage Area loading ratio of 8:1 has also been met. The drainage area loading ratio for the site is 5.5:1.
S. Pennell Road	The maximum impervious loading ratio of 5:1 has been met. The impervious loading ratio for the site is 2.7:1. The maximum Drainage Area loading ratio of 8:1 has also been met. The drainage area loading ratio for the site is 5.6:1.

Below is a summary table of the stormwater volume and rate increase associated with the drainage areas at the permanent access roads and valve sites. Recommended infiltration rates were determined based on site evaluation, infiltration test rates from onsite testing, and the proximity and depth of the test locations compared to the proposed BMP. Recommended infiltration rates are provided in Attachment 5 of this report.

Access Road/Valve Site	County	Pre-Development Runoff Volume (acre-feet)	Post-Development Runoff Volume (acre-feet) w/o BMPs	Post-Development Runoff Volume (acre-feet) with BMPs	PCSM BMP Selected
Fairview Road	Chester	0.010	0.027	0.000	Infiltration Berm
E. Lincoln Highway	Chester	0.014	0.030	0.008	Infiltration Berm
Boot Road	Delaware	0.094	0.111	0.075	Infiltration Berm
S. Pennell Road	Delaware	0.035	0.049	0.012	Infiltration Berm

Access Road/Valve Site	Pre-Dev. Rate, 2-year (cfs)	Post-Dev. Rate, 2-year (cfs)	Pre-Dev. Rate, 10-year (cfs)	Post-Dev. Rate, 10-year (cfs)	Pre-Dev. Rate, 50-year (cfs)	Post-Dev. Rate, 50-year (cfs)	Pre-Dev. Rate, 100-year (cfs)	Post-Dev. Rate, 100-year (cfs)
Fairview Road	0.000	0.000	0.010	0.006	0.147	0.090	0.628	0.383
E. Lincoln Highway	0.700	0.559	2.247	1.696	4.571	3.379	5.814	4.274
Boot Road	3.60	2.86	7.19	5.55	11.84	9.00	14.20	10.72
S. Pennell Road	0.51	0.20	1.22	0.47	2.23	0.85	2.75	1.60

Note: Post development rate is detained runoff. Calculations for pre, post, and detained runoff are provided in Attachment 4.

5.0 REFERENCES

Erosion and Sediment Pollution Control Program Manual, Commonwealth of Pennsylvania, Department of Environmental Protection, Office of Water Management, March 2012.

Stormwater Management for Construction Activities - Developing Pollution Prevention Plans and Best Management Practices, United States Environmental Protection Agency, Office of Water, 1993.

Pennsylvania Stormwater Best Management Practices Manual, Pennsylvania Department of Environmental Protection, Bureau of Watershed Management, December 2006.

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Media, West Chester, Marcus Hook, and Bridgeport Quadrangles, Pennsylvania – Delaware County, Geological Survey, United States Department of Interior.

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Receiving Waters Table

Pennsylvania Pipeline Project

Southeast Region

Stream Name	County	Township	Chapter 93 Designated Use (Existing Use, if applicable)	Chapter 93 Code	Siltation Impaired
UNT to Conestoga River	Chester	West Nantmeal	WARM WATER FISHES	WWF	No
UNT to South Branch French Creek	Chester	West Nantmeal	EXCEPTIONAL VALUE	EV	No
South Branch French Creek	Chester	West Nantmeal	EXCEPTIONAL VALUE	EV	No
UNT to Marsh Creek	Chester	West Nantmeal	HIGH QUALITY-TROUT STOCKING	HQ	No
UNT to Marsh Creek	Chester	East Nantmeal	HIGH QUALITY-TROUT STOCKING	HQ	No
UNT to Upper East Branch Brandywine Creek	Chester	Wallace	HIGH QUALITY-TROUT STOCKING	HQ	No
UNT to Marsh Creek	Chester	Wallace	WARM WATER FISHES	HQ	No
UNT to Marsh Creek	Chester	Upper Uwchlan	HIGH QUALITY-TROUT STOCKING	HQ	No
Marsh Creek	Chester	Upper Uwchlan	HIGH QUALITY-TROUT STOCKING	HQ	No
Black Horse Creek	Chester	Upper Uwchlan	HIGH QUALITY-TROUT STOCKING	HQ	No
UNT to Black Horse Creek	Chester	Upper Uwchlan	HIGH QUALITY-TROUT STOCKING	HQ	No
Shamona Creek	Chester	Uwchlan	HIGH QUALITY-TROUT STOCKING	HQ	Yes
UNT to Shamona Creek	Chester	Uwchlan	HIGH QUALITY-TROUT STOCKING	HQ	Yes
UNT to Upper East Branch Brandywine Creek	Chester	Uwchlan	HIGH QUALITY-TROUT STOCKING	HQ	No
UNT to Valley Creek	Chester	Uwchlan	COLD WATER FISHES	CWF	Yes
UNT to Valley Creek	Chester	West Whiteland	COLD WATER FISHES	CWF	Yes
Valley Creek	Chester	West Whiteland	COLD WATER FISHES	CWF	Yes
East Branch Chester Creek	Chester	West Whiteland	TROUT STOCKING	TSF	Yes
East Branch Chester Creek	Chester	West Goshen	TROUT STOCKING	TSF	Yes
UNT to Chester Creek	Chester	West Goshen	TROUT STOCKING	TSF	Yes
UNT to Ridley Creek	Chester	West Goshen	HIGH QUALITY-TROUT STOCKING	HQ	Yes
UNT to Chester Creek	Chester	Westtown	TROUT STOCKING	TSF	Yes
UNT to Ridley Creek	Chester	Westtown	HIGH QUALITY-TROUT STOCKING	TSF	Yes
UNT to Ridley Creek	Delaware	Thornbury	HIGH QUALITY-TROUT STOCKING	TSF	Yes
UNT to Chester Creek	Delaware	Thornbury	TROUT STOCKING	TSF	Yes
UNT to Chester Creek	Delaware	Edgmont	TROUT STOCKING	TSF	Yes
UNT to Ridley Creek	Delaware	Edgmont	TROUT STOCKING	TSF	Yes
UNT to Chester Creek	Delaware	Middletown	TROUT STOCKING	TSF	Yes
Rocky Run	Delaware	Middletown	HIGH QUALITY-COLD WATER FISHES	HQ	Yes
UNT to Rocky Run	Delaware	Middletown	HIGH QUALITY-COLD WATER FISHES	HQ	Yes
UNT to Chester Creek	Delaware	Middletown	TROUT STOCKING	TSF	Yes

Receiving Waters Table

Pennsylvania Pipeline Project

Southeast Region

Stream Name	County	Township	Chapter 93 Designated Use (Existing Use, if applicable)	Chapter 93 Code	Siltation Impaired
Chrome Run	Delaware	Middletown	TROUT STOCKING	TSF	Yes
Crum Run	Delaware	Middletown	TROUT STOCKING	TSF	Yes
UNT to Crum Run	Delaware	Middletown	TROUT STOCKING	TSF	Yes
Chester Creek	Delaware	Middletown	TROUT STOCKING	TSF	Yes
UNT to Chester Creek	Delaware	Aston	TROUT STOCKING	TSF	Yes
Chester Creek	Delaware	Aston	TROUT STOCKING	TSF	Yes
Chester Creek	Delaware	Aston	WARM WATER FISHES	WWF	Yes
UNT to Delaware River	Delaware	Aston	WARM WATER FISHES	WWF	No
UNT to Baldwin Run	Delaware	Aston	WARM WATER FISHES	WWF	Yes
Chester Creek	Delaware	Brookhaven	WARM WATER FISHES	WWF	Yes
UNT to Baldwin Run	Delaware	Chester	WARM WATER FISHES	WWF	Yes
Baldwin Run	Delaware	Chester	WARM WATER FISHES	WWF	Yes
UNT to Chester Creek	Delaware	Chester	WARM WATER FISHES	WWF	Yes
UNT to Delaware River	Delaware	Chester	WARM WATER FISHES	WWF	No
UNT to Baldwin Run	Delaware	Upper Chichester	WARM WATER FISHES	WWF	Yes
UNT to Delaware River	Delaware	Upper Chichester	WARM WATER FISHES	WWF	No

Receiving Wetlands
Pennsylvania Pipeline Project
South-East Region

Municipality	Receiving Water	Number of Wetlands	Number of EV Wetlands (Classification)
CHESTER COUNTY			
West Nantmeal	UNT to South Branch French Creek	9	7 (EV Stream)
West Nantmeal	UNT to Marsh Creek	1	0
East Nantmeal	UNT to Marsh Creek	2	0
Wallace	UNT to Marsh Creek	6	0
Upper Uwchlan	UNT to Marsh Creek	18	0
Upper Uwchlan	UNT to Black Horse Creek	4	2 (Wild Trout/Bog Turtle)
Uwchlan	UNT to Shamona Creek	5	1 (Wild Trout)
West Whiteland	UNT to Valley Creek	17	0
West Whiteland	UNT to Chester Creek	2	0
West Goshen	UNT to Chester Creek	1	0
East Goshen	UNT to Chester Creek	2	0
Westtown	UNT to Chester Creek	1	0
DELAWARE COUNTY			
Edgmont	UNT to Chester Creek	6	0
Middletown	UNT to Chester Creek	18	2 (PuWS)
Middletown	UNT to Rocky Run	4	1 (Wild Trout)
Middletown	UNT to Chrome Creek	1	
Aston	UNT to Chester Creek	1	0
Aston	UNT to Baldwin Run	3	0
Chester	UNT to Baldwin Run	12	0
Chester	UNT to Chester Creek	2	0
Upper Chichester	UNT to Baldwin Run	14	0