Site Restoration and Post-Construction Stormwater Management Plan

Pennsylvania Pipeline Project - South Central Region: Spreads 3, 4, 5

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LIST OF ACRONYMS

ACRONYM	MEANING
ABACT	Antidegradation Best Available Combination of Technologies
BMP	Best Management Practice
E&SC	Erosion and Sediment Control
HDD	Horizontal directional drilling
HDPE	High-density polyethylene
HQ	High quality
NGL	Natural gas liquids
PADEP	Pennsylvania Department of Environmental Protection
PASDA	Pennsylvania Spatial Data Access
PCSM	Post-Construction Stormwater Management
ROW	Right of way
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 Central Region: Spreads 3, 4, and 5. The Plan addresses activities associated with the Sunoco Pennsylvania Pipeline Project (SPPP) installation. Spreads 3, 4, and 5 (South Central Region) of this project are located in Blair, Huntingdon, Juniata, Perry, Cumberland, York, Dauphin, Lebanon, Lancaster, and Berks 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 vegetated block valve sites (Old York (where it's not already existing impervious area), Seven Points Loop, and Wyomissing) 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. Both pipelines will be installed within the same limit of disturbance (LOD) and in the same construction period. This Plan specifically relates to impacts associated with the South Central Region, Construction Spreads 3, 4, and 5.

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 site restoration. The total LOD in the South Central Region will be approximately 1,692 acres. Acres disturbed by county will be as follows: Blair County with 230 acres disturbed, Huntingdon County with 270 acres disturbed, Juniata County with 31 acres disturbed, Perry County with 118 acres disturbed, Cumberland County with 306 acres disturbed, York County with 69 acres disturbed, Dauphin County with 131 acres disturbed, Lebanon County with 223 acres disturbed, Lancaster County with 75 acres disturbed, and Berks County with 239 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.

Twenty nine block valves are required to operate the pipeline for the PADEP Southcentral Region portion of the PPP project. Of those twenty nine, five (Doylesburg, Blue Mountain, Plainfield, White House Lane, and Blainsport) will utilize existing impervious areas entirely, and one (Cornwall) will be accounted for as part of the pump station's PCSM Plan. Below is a summary table of the twenty nine block valves that will be constructed or co-located at an existing block valve with a proposed expansion.

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?
Valley Forge Road	New	Blair	Juniata	Trib 16353 to Dry Run	WWF	-	Metals, pH, Organic Enrichment/ Low D.O.	Yes
Charger Highway	New	Blair	Blair	Trib 16332 to Beaverdam Breach	WWF	-	Metals, pH, Organic Enrichment/ Low D.O.	Yes
Locke Mountain Road	New	Blair	Frankstown	Trib 16298 to Robinson Run	WWF	-	None	Yes
Juniata Valley Road	New	Blair	Frankstown	UNT to Frankstown Branch Juniata River	WWF	-	Industrial Point Source – Suspended Solids	Yes
High Street	New	Blair	Woodbury	Trib 16213 to Piney Creek	HQ-CWF	-	None	Yes
Raystown Road	New	Huntingdon	Penn	Trib 13451 to James Creek	WWF	-	None	Yes
Seven Points Loop	New – no impervious proposed	Huntingdon	Penn	Trib 13404 to Raystown Branch Juniata River	WWF	-	None	Yes
Happy Hills Road	New	Huntingdon	Union	Trib 13585 of Little Trough Creek	TSF	-	None	Yes
Hares Valley Road	New	Huntingdon	Union	Trib 13276 To Hares Valley Creek	TSF	-	None	Yes
Shade Valley Road	Co-located	Huntingdon	Tell	George Creek	CWF	-	None	Yes
Doylesburg	Existing no change in footprint	Perry	Toboyne	Sherman Creek	HQ-CWF	-	None	Yes
Blue Mountain	Existing no change in footprint	Cumberland	Lower Mifflin	Doubling Gap Creek	HQ-CWF	-	None	No

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?
Plainfield	Existing no change in footprint	Cumberland	Lower Frankford	UNT to Opossum Creek	HQ-TSF	-	None	No
Creek Road	New	Cumberland	North Middletown	Conodoguinet Creek	WWF	-	None	Yes
Wolf Bridge Road	New	Cumberland	Middlesex	Conodoguinet Creek	WWF	-	None	Yes
W. Trindle Road	New	Cumberland	Silver Spring	Trindle Spring Run	CWF (siltation impaired)	-	Agriculture – Siltation, Construction – Siltation, Urban Runoff/Storm Sewers - Cause Unknown	Yes
Arcona Road	New	Cumberland	Lower Allen	Trib 63068 to Cedar Run	CWF (siltation impaired)	-	Source Unknown - Pathogens, Agriculture – Nutrients, Agriculture – Siltation, Agriculture - Other Habitat Alterations	Yes
Old York Road	Co-located – no additional impervious proposed	York	Fairview	Trib 10114 to Marsh Creek	WWF	-	None	Yes
White House Lane	Existing no change in footprint	Dauphin	Lower Swatara	Susquehanna River	WWF	-	None	No
N. Union Street	New	Dauphin	Lower Swatara/ Middletown	UNT to Swatara Creek	WWF	-	None	Yes
Gates Road	Co-located	Dauphin	Conewago	UNT to Spring Creek	WWF (siltation impaired)	-	Source Unknown - Pathogens, Agriculture - Organic	Yes

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?
							Enrichment/ Low D.O., Agriculture - Siltation	
Cornwall	Existing co-located	Lebanon	West Cornwall	Beck Creek	TSF	-	None	No
Schaeffer Road	New	Lebanon	South Lebanon	UNT to Quittapahilla Creek	TSF	-	Pathogens, Urban Runoff/Storm Sewers, Bank Modifications, Other Habitat Alterations	Yes
Sinclair Road	New	Lebanon	Heidelberg	Trib 07680 to Hammer Creek	CWF	-	Source Unknown - Pathogens	Yes
Hopeland Road	Co-located	Lebanon	Heidelberg	Middle Creek	WWF	-	None	Yes
Blainsport	Existing no change in footprint	Lancaster	West Cocalico	UNT to Harnish Run	WWF	-	None	No
Montello	Co-located	Berks	Spring	UNT to Cacoosing Creek	CWF	-	None	Yes
Wyomissing Road	New – no impervious proposed	Berks	Cumru	Wyomissing Creek	HQ-CWF	-	None	Yes
Morgantown Road	New	Berks	New Morgan	Hay Creek	EV	-	Source Unknown - Pathogens	Yes

2.1 TOPOGRAPHY

The work zone is located on ground of varying elevations. Site elevations vary from 285 feet (Susquehanna River) to 2,251 feet (apprximately 8,250 feet along centerline from the western border of Blair 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 vegetated block valve sites. Following completion of pipeline installation and trench backfilling, the pipeline right of way, associated workspaces, and temporary access roads shall be returned to the general grade present prior to pipeline installation in order to maintain preconstruction drainage patterns. After completion of major construction work, topsoil that was stockpiled during construction will be placed along the ROW. Grounds disturbed by any of the operations necessary to complete the work for this project are to be permanently seeded, or if specified, sodded, unless occupied by structures, paved or designated as a permanent access road. Disturbed areas, which are at final grade, shall be seeded and mulched once final grades are achieved. The permanent seed mixture will restore disturbed areas to a meadow in good condition or better. If seeding cannot be completed within a four (4) day period due to weather conditions, the disturbed area will be mulched with straw at the rate of three (3) tons per acre. This straw will be anchored using a method 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 site restoration and post-construction stormwater management of the site. Necessary steps for proper and complete execution of work pertaining to this plan, whether specifically mentioned or not, are to be performed by the contractor. The contractor will comply with all requirements listed in this section. The contractor may be required to alter controls based on the effectiveness of controls or differing conditions encountered in the field. The appropriate county conservation district and DEP shall be contacted and must approve any deviation to the authorized plans.

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

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 (8)
1 (2)	spring oats (spring), or 64 96	64	96
	annual ryegrass (spring or fall), or	10	15
	winter wheat (fall), or	90	120
	winter rye (fall)	56	112
2 (3)	tall fescue, or 75	60	75
	fine fescue, or 40	35	40
	kentucky bluegrass, plus 25 30	25	30
	redtop(4), or	3	3
	perennial ryegrass	15	20
3	birdsfoot trefoil, plus 6 10	6	10
	tall fescue	30	35
4	birdsfoot trefoil, plus	6	10
	reed canarygrass	10	15
5 (5)	Big Bluestem, plus	10	15
	tall fescue, or	20	25
	perennial ryegrass	20	25
6 (5,6)	Big Bluestem, plus	10	15
	annual ryegrass	20	25
7 (5)	birdsfoot trefoil, plus	20	30
	Big Bluestem, plus	20	30
	tall fescue	20	25
8	flatpea, plus	20	30
	tall fescue, or	20	30
	perennial ryegrass	20	25
9	Not applicable to project	N/A	N/A
10	tall fescue, plus	40	60
	fine fescue	10	15
11	deertongue, plus	15	20
	birdsfoot trefoil	6	10
12(7)	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. Note not applicable because the project does not propose the use of Crownvetch.

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

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

8. 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		
WELL-DRAINED	1 PLUS	5, 7, 8, OR 10
VARIABLE DRAINED	1 PLUS	3 OR 7
POORLY DRAINED	1 PLUS	3
AREAS MOWED SEVERAL TIMES PER YEAR	1 PLUS	2, 3, OR 10
UTILITY ROW		
WELL-DRAINED	1 PLUS	5, 8, OR 12 (1)
VARIABLE DRAINED	1 PLUS	3 OR 7
WELL-DRAINED AREAS FOR GRAZING/HAY	1 PLUS	2, 3, OR 13
EFFLUENT DISPOSAL AREAS	1 PLUS	3 OR 4
SANITARY LANDFILLS	1 PLUS	3, 5, 7, 11 (1), OR 12 (1)
SURFACE MINES		

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

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 right-of-way (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 cross through Blair, Huntingdon, Juniata, Perry, Cumberland, York, Dauphin, Lebanon, Lancaster, and Berks Counties, Pennsylvania (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 limit of disturbance 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 limit of disturbance 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 limit of disturbance 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 Erosion and Sediment Control Plan and Site Restoration/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 site restoration plan is proposed to revegetate the areas adjacent to the buffers within the right of way.

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 right of way 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 that will be restored to a vegetated condition, which excludes permanent impervious cover proposed at 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 or lawn 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.

Twenty nine block valves are required to operate the pipeline for the PADEP Southcentral Region portion of the PPP project. Of those twenty nine, five (Doylesburg, Blue Mountain, Plainfield, White House Lane, and Blainsport) will utilize existing impervious areas entirely, and one (Cornwall) will be accounted for as part of the pump station's PCSM Plan. Of the remaining twenty three block valve sites, three do not propose the addition of an impervious surface (Seven Points Loop and Wyomissing will be entirely vegetated with geoweb underlayment to maintain void space and provide structural stability, and Old York will not expand the existing impervious area at the co-located valve site). Several of the other twenty sites are also adjacent to existing SPLP owned block valve sites which minimizes the new footprint for additional gravel area and access roads. Raystown Road and Sinclair Road block valves will require infiltration testing after installation of the pipeline to verify the post construction infiltration capacity of the soil. The following sections address PCSM for the twenty valve sites that include a proposed, impervious surface.

4.1 BMP DESCRIPTION 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.

Infiltration Trench

An infiltration trench is a stone filled trench with a level bottom and a continuously perforated pipe(s). Infiltration trenches will retain stormwater runoff and allow for infiltration. Infiltration trench depths vary between 1 to 3 feet below existing grade.

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.

Slow Release Trench

A slow release trench is a stone filled trench with a level bottom and a continuously perforated pipe. The trench will be lined with an impermeable liner. A slow release trench will retain stormwater runoff and release it slowly in areas where infiltration is undesirable or not feasible based on site soils.

Channel

Channels will be constructed to capture and convey stormwater runoff to PCSM BMPs.

Water Deflector

Water deflectors will be installed along several of the permanent access roads to convey runoff across the roadway. A deflector is typically constructed from a rubber belt held between two wooden planks.

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

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

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.

Infiltration Trench

1. Install and maintain proper Erosion and Sediment Control Measures during construction.
2. Grade surface to finished grade elevations as soon as practicable.

3. Protect Infiltration Trench area from compaction prior to installation. Install orange construction fence around the trench and, if applicable, the ponding area of the downslope berm.
4. If possible, install Infiltration Trench during later phases of site construction to prevent sedimentation and/or damage from construction activity. After installation, prevent sediment laden water from entering inlets and pipes. If it is not possible to install the Infiltration Trench during the later phases of construction, place compost filter sock upslope of the trench to prevent sediment from reaching and clogging the trench.
5. Excavate Infiltration Trench bottom to a uniform, level uncompacted subgrade free from rocks and debris. Do not compact subgrade. The construction equipment shall remain outside of the Infiltration Trench while excavating it. This is a critical step of the sequence which requires oversight by a licensed professional.
6. Place nonwoven geotextile along bottom and sides of trench. Nonwoven geotextile rolls should overlap by a minimum of 16 inches within the trench. Fold back and secure excess geotextile during stone placement. This is a critical step of the sequence which requires oversight by a licensed professional.
7. Install upstream and downstream Control Structures, cleanouts, etc. This is a critical step of the sequence which requires oversight by a licensed professional.
8. Place uniformly graded, clean-washed aggregate in 8-inch lifts, lightly compacting between lifts. Light compaction shall ensure the aggregate won't settle below the intended top elevation of the trench. Care shall be taken so as not to compact the subgrade. This is a critical step of the sequence which requires oversight by a licensed professional.
9. Install Continuously Perforated Pipe as indicated on plans. Backfill with uniformly graded, clean-washed aggregate in 8-inch lifts, lightly compacting between lifts. Light compaction shall ensure the aggregate won't settle below the intended top elevation of the trench. Care shall be taken so as not to compact the subgrade. This is a critical step of the sequence which requires oversight by a licensed professional.
10. Fold and secure nonwoven geotextile over Infiltration Trench, with minimum overlap of 16- inches. This is a critical step of the sequence which requires oversight by a licensed professional.
11. Place 6-inch lift of approved Topsoil over Infiltration Trench, as indicated on plans.
12. Seed and stabilize topsoil.
13. Any sediment that enters inlets during construction is to be removed within 24 hours.
14. Immediately seed and mulch disturbed areas once final grade is established in accordance with the permanent seeding schedule.
15. Maintain erosion and sedimentation control devices until site work is complete and a uniform 70% perennial vegetative cover is established.
16. Remove erosion sediment control measures upon establishment of a uniform 70% vegetative cover over the disturbed area. Re-grade and revegetate areas disturbed during the removal of the erosion and sediment controls.

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.

Slow Release Trench

1. Install and maintain proper Erosion and Sediment Control Measures during construction.
2. Grade surface to finished grade elevations as soon as practicable.
3. If possible, install Slow Release Trench during later phases of site construction to prevent sedimentation and/or damage from construction activity. After installation, prevent sediment laden water from entering inlets and pipes. If it is not possible to install the Slow Release Trench during the later phases of construction, place compost filter sock upslope of the trench to prevent sediment from reaching and clogging the trench.
4. Excavate Slow Release Trench bottom to a uniform, level subgrade free from rocks and debris. This is a critical step of the sequence which requires oversight by a licensed professional.
5. Install an impermeable liner within the Slow Release Trench. Secure impermeable liner during stone placement with an anchor trench. This is a critical step of the sequence which requires oversight by a licensed professional.
6. Install upstream and downstream Control Structures, cleanouts, etc. This is a critical step of the sequence which requires oversight by a licensed professional.
7. Place uniformly graded, clean-washed aggregate in 8-inch lifts, lightly compacting between lifts. Light compaction shall ensure the aggregate won't settle below the intended top elevation of the trench. This is a critical step of the sequence which requires oversight by a licensed professional.
8. Install Continuously Perforated Pipe and underdrain outlet as indicated on plans. Backfill with uniformly graded, clean-washed aggregate in 8-inch lifts, lightly compacting between lifts. Light compaction shall ensure the aggregate won't settle below the intended top elevation of the trench. This is a critical step of the sequence which requires oversight by a licensed professional.
9. Place 6-inch lift of approved Topsoil over Slow Release Trench, as indicated on plans.
10. Seed and stabilize topsoil.

11. Any sediment that enters inlets during construction is to be removed within 24 hours.
12. Immediately seed and mulch disturbed areas once final grade is established in accordance with the permanent seeding schedule.
13. Maintain erosion and sedimentation control devices until site work is complete and a uniform 70% perennial vegetative cover is established.
14. Remove erosion sediment control measures upon establishment of a uniform 70% vegetative cover over the disturbed area. Re-grade and revegetate areas disturbed during the removal of the erosion and sediment controls.

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 (8)
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

RECOMMENDED SEED MIXTURES			
MIXTURE NO.	**SPECIES**	**SEEDING RATES – PLS (1)**	
		MOST SITES	ADVERSE SITES (8)
7 (5)	annual ryegrass	20	25
	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	Not applicable to project	N/A	N/A
10	tall fescue, plus	40	60
	fine fescue	10	15
11	deertongue, plus	15	20
	birdsfoot trefoil	6	10
12(7)	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. Note not applicable because the project does not propose the use of Crownvetch.

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

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

8. 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		
WELL-DRAINED	1 PLUS	5, 7, 8, OR 10
VARIABLE DRAINED	1 PLUS	3 OR 7
POORLY DRAINED	1 PLUS	3
AREAS MOWED SEVERAL TIMES PER YEAR	1 PLUS	2, 3, OR 10
UTILITY ROW		
WELL-DRAINED	1 PLUS	5, 8, OR 12 (1)
VARIABLE DRAINED	1 PLUS	3 OR 7
WELL-DRAINED AREAS FOR GRAZING/HAY	1 PLUS	2, 3, OR 13
EFFLUENT DISPOSAL AREAS	1 PLUS	3 OR 4
SANITARY LANDFILLS	1 PLUS	3, 5, 7, 11 (1), OR 12 (1)
SURFACE MINES		
SPOILS, MINE WASTES, FLY ASH, SLAG, SETTLING BASIN RESIDUES AND OTHER SEVERELY DISTURBED AREAS (LIME TO SOIL TEST)	1 PLUS	3, 4, 5, 7, 8, 11 (1) OR 12(1)
SEVERELY DISTURBED AREAS FOR GRAZING/HAY	1 PLUS	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 amendments 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
Valley Forge Road	WWF	-	Potential pollution to surface waters from thermal impacts will be minimized by minimizing clearing and retaining existing vegetation where possible during construction.

Block valve	Designated Use	Existing use	Site Specific Thermal Impact Analysis
			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 100 feet through riparian area to the nearest receiving water.
Charger Highway	WWF	-	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 underground slow release trenches prior to discharge. The subsurface slow release trenches will prevent direct sunlight from reaching the stored stormwater runoff. A direct surface outlet is not proposed to the receiving surface water. The surface water flows several hundred feet across a mild slope to the nearest receiving water.
Locke Mountain Road	WWF	-	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 underground slow release trenches prior to discharge. The subsurface slow release trenches will prevent direct sunlight from reaching the stored stormwater runoff. A direct surface outlet is not proposed to the receiving surface water. The surface water flows across a very mild slope approximately 80 feet to the nearest receiving water.
Juniata Valley Road	WWF	-	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 underground slow release trenches prior to discharge. The subsurface slow release trenches will prevent direct sunlight from reaching the stored stormwater runoff. A direct surface outlet is not proposed to the receiving surface water. The surface water flows across a very mild slope several hundred feet to the nearest receiving water.

Block valve	Designated Use	Existing use	Site Specific Thermal Impact Analysis
High Street	HQ-CWF	-	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. During larger storm events, water will overflow the infiltration berm into an area of soil amendment, which will further promote infiltration. Any surface water which does not infiltrate will flow across a gradual slope approximately 700 feet through a riparian area to the nearest receiving water.
Raystown Road	WWF	-	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 and infiltration trench to cool runoff prior to discharge. The infiltration facilities are proposed to infiltrate runoff which would recharge the groundwater and allow for cooling. Ponded water can result in significant thermal impacts. The infiltration berm and trench 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. During larger storm events, water will overflow the infiltration berm and trench onto a vegetated area prior to entering the surface water. A direct surface outlet is not proposed to the receiving surface water. The surface water flows across a mild slope approximately 75 feet through a riparian area to the nearest receiving water.
Happy Hills 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. An infiltration berm with upslope soil amendment is proposed to 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

Block valve	Designated Use	Existing use	Site Specific Thermal Impact Analysis
			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 gradual slope approximately 1,000 feet through a riparian area to the nearest receiving water.
Hares Valley 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. A series of 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 gradual slope approximately 400 feet through a riparian area to the nearest receiving water.
Shade Valley Road	CWF	-	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. Runoff will have the opportunity to infiltrate rather than discharging directly to a nearby surface water, thereby maintaining the cold water habitat. The surface water flows across a mild slope approximately 300 feet through a riparian area to the nearest receiving water.
Creek Road	WWF	-	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 underground slow release trench prior to discharge. The subsurface slow release trench will prevent direct sunlight from reaching the stored stormwater runoff. A direct surface outlet is not proposed to the receiving surface water. The

Block valve	Designated Use	Existing use	Site Specific Thermal Impact Analysis
			surface water flows approximately 150 feet to the nearest receiving water.
Wolf Bridge Road	WWF	-	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 underground slow release trench prior to discharge. The subsurface slow release trench will prevent direct sunlight from reaching the stored stormwater runoff. A direct surface outlet is not proposed to the receiving surface water. The surface water flows across a mild slope approximately 650 feet through a riparian area to the nearest receiving water.
W. Trindle Road	CWF	-	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 infiltration trenches, which store water below grade allowing the runoff to cool and infiltrate. Sunlight will not reach stormwater stored within the subsurface infiltration trenches. A direct surface outlet is not proposed to the receiving surface water. During larger storm events, water will overflow the trench onto a vegetated area prior to entering the surface water. Runoff will have the opportunity to infiltrate rather than discharging directly to a nearby surface water, thereby maintaining the cold water habitat.
Arcona Road	CWF	-	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. During larger storm events, water will overflow the infiltration berm onto a vegetated area prior to entering the surface water. The surface water flows across a very mild slope approximately 1,300 feet 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.

Block valve	Designated Use	Existing use	Site Specific Thermal Impact Analysis
N. Union Street	WWF	-	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 gradual slope for several hundred feet to the nearest receiving water.
Gates Road	WWF	-	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. During larger storm events, water will overflow the infiltration berm onto a vegetated area prior to entering the surface water. A direct surface outlet is not proposed to the receiving surface water. The surface water flows across a mild slope approximately 350 feet to the nearest receiving water.
Schaeffer 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 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. During larger storm events, water will overflow the infiltration berm onto a vegetated area prior to entering the surface water. A direct surface outlet is not proposed to the receiving surface water. Runoff will have the opportunity to infiltrate rather than

Block valve	Designated Use	Existing use	Site Specific Thermal Impact Analysis
			discharging directly to a nearby surface water, thereby maintaining the receiving water's designated use.
Sinclair Road	CWF	-	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 soil amendment areas and an infiltration berm to cool runoff prior to discharge. The infiltration berm and soil amendment area 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. During larger storm events, water will overflow the infiltration berm onto a vegetated area prior to entering the surface water. A direct surface outlet is not proposed to the receiving surface water. Runoff from the impervious areas will discharge to areas that have been restored to a meadow condition or that are previously undisturbed.
Hopeland Road	WWF	-	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. During larger storm events, water will overflow the infiltration berm onto a vegetated area prior to entering the surface water. A direct surface outlet is not proposed to the receiving surface water. The surface water flows across a mild slope through a riparian area approximately 850 feet to the nearest receiving water.
Montello	CWF	-	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 infiltration berms and an infiltration trench to cool runoff prior to discharge. The infiltration berms and trench will infiltrate runoff which would recharge the groundwater and allow for cooling. Ponded water can result in significant thermal impacts. The

Block valve	Designated Use	Existing use	Site Specific Thermal Impact Analysis
			infiltration berm has been designed to dewater in less than 72 hours, so water will not pond for a significant period of time. The water stored within the infiltration trench will not receive exposure to direct sunlight. During larger storm events, water will overflow the infiltration berms and trench onto a vegetated area prior to entering the surface water. 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, thereby maintaining the cold water habitat.
Morgantown Road	EV	-	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 underground slow release trenches prior to discharge. The subsurface slow release trenches will prevent direct sunlight from reaching the stored stormwater runoff. Water that overflows the slow release trenches during larger storm events will flow into areas of soil amendment downslope of the trench, which will promote infiltration. A direct surface outlet is not proposed to the nearest receiving surface 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 right-of-way (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, Pennsylvania (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 limit of disturbance 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 limit of disturbance 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 limit of disturbance 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 Erosion and Sediment Control Plan and Site Restoration/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 right of way 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.

Infiltration Trench

- Catch Basins and Inlets for the infiltration trench should be inspected and cleaned, as necessary, at least 4 times per year.

- The vegetation along the surface of the Infiltration Trench should be maintained in good condition, and any bare spots revegetated as soon as possible.
- Vehicles should not be parked or driven on a vegetated Infiltration Trench, and care should be taken to avoid excessive compaction by mowers.
- Monitor drawdown time after the first major storm event. The trench shall dewater within a maximum of 72 hours. If the trench is not infiltrating within the specified timeframe, amend the soils within the ponding area of the trench (see Soil Amendment detail in plans).

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).

Slow Release Trench

- Inlets and outlets for the slow release trench should be inspected and cleaned, as necessary, at least 4 times per year.
- The vegetation along the surface of the slow release trench should be maintained in good condition, and any bare spots revegetated as soon as possible.
- Vehicles should not be parked or driven on a slow release trench.

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.

Water Deflector

- Inspections to be done annually and within 48 hours after every major storm event (> 1 inch rainfall depth).
- Accumulated sediment shall be removed from the water deflector. The rubber belt shall be replaced when it is worn and no longer effective.

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.

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
High Street	HQ-CWF	-	High Street 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 High Street block valve was limited to the amount that is required to safely construct and operate the block valve. In

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			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 High Street 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 High Street, were located in special protection watersheds. Non-discharge alternatives were also considered when determining the type of BMP proposed. High Street 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 the 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

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			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 High Street 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.
W. Trindle Road	CWF (siltation impaired)	-	West Trindle 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 West Trindle Road valve site 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 West Trindle 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 West Trindle Road, were located in special protection or siltation impaired watersheds. Non-discharge alternatives were also considered when determining the type of BMP proposed. West Trindle Road block valve site utilizes two infiltration trenches 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 trench, or to undisturbed area. There will not be an increase in stormwater runoff rate or volume to prevent

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			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 trenches. Ponded runoff will be temporarily stored upslope of the trench using a berm until it infiltrates and filters through the soil media. Due to the design of the trench 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 West Trindle 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.
Arcona Road	CWF (siltation impaired)	-	Arcona Road block valve is located within a siltation impaired watershed. The project site was designed to minimize the total amount of impervious area required. The impervious area for the Arcona Road valve was limited to the amount that is required to safely construct and operate the block valve. In

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			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 Arcona 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 Arcona Road, were located in special protection or siltation impaired watersheds. Non-discharge alternatives were also considered when determining the type of BMP proposed. Arcona 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

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			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 Arcona 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.
Gates Road	WWF (siltation impaired)	-	Gates 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 Gates Road 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. Finally, an existing access road was utilized for the site, thus eliminating the need to create a larger impervious area. Non-discharge alternatives were analyzed for this block valve site. The location of the Gates 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 Gates Road, were located in special protection or siltation impaired watersheds. Non-discharge alternatives were also considered when determining the type of BMP proposed. Gates 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

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			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 Gates 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.
Morgantown	EV	-	Morgantown 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

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			area for the Morgantown 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 Morgantown 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 Morgantown Road, were located in special protection watersheds. Non-discharge alternatives were also considered when determining the type of BMP proposed. Morgantown Road block valve site utilizes slow-release BMPs 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 slow-release BMPs, 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 slow-release BMPs. Ponded runoff will be temporarily stored upslope of the trench until it infiltrates and filters through the soil media. Due to the design of the slow-release BMPs 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.

Block valve	Designated Use	Existing use	Site Specific Anti-degradation Analysis
			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 Morgantown 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 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

No additional or new impervious area are proposed for Perry and Juniata Counties with this phase of the application. Additional impervious areas for block valves and access roads were evaluated for Blair, Huntingdon, Cumberland, York, Dauphin, Lebanon, Lancaster and Berks counties. The stormwater runoff analysis for the pump stations at Mt. Union, Doylesburg, Middletown, and Beckersville are prepared under separate cover.

Twenty nine block valves are required to operate the pipeline for the PADEP Southcentral Region portion of the PPP project. Of those twenty nine, five (Doylesburg, Blue Mountain, Plainfield, White House Lane, and Blainsport) will utilize existing impervious areas entirely, and one (Cornwall) will be accounted for as part of the pump station's PCSM Plan. Of the remaining twenty three block valve sites, three do not propose the addition of an impervious surface (Seven Points Loop and Wyomissing will be entirely vegetated with geoweb underlayment to maintain void space and provide structural stability, and Old York will not expand the existing impervious area at the co-located valve site). Several of the other twenty sites are also adjacent to existing SPLP 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 permanent facilities 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.

The stormwater runoff rate and volume were evaluated for the drainage area encompassing the access road and/or valve site that drains to the nearest receiving water. 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 following sites are believed to be within a 1.5-mile radius of documented sinkholes or depressions (source: http://www.gis.dcnr.state.pa.us/maps/): Juniata Valley, W. Trindle, Arcona, Schaeffer, and Montello.

The following sites are not believed to be within the nearby vicinity of documented sinkholes or depressions but are located on karst terrain (carbonates): Charger, Shade Valley, High Street, and Happy Hills.

At each of the block valve sites located in areas of 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 designs:

- 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 each of the block valve sites' 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**
Valley Forge Road	The loading ratio of 8:1 (drainage area:infiltration area) is exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. The impervious loading ratio for the site is 4.9:1. The drainage area loading ratio for the site is 20:1. Although the detained drainage area to the PCSM BMP is slightly above 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 infiltrate within 72 hours. Based on sound engineering judgment of 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 berms will fail as a result of the designed loading ratios. Runoff from the impervious area and upslope contributory drainage area will be dispersed over three infiltration berms. The infiltration berms will be inspected regularly (at least 4 times per year) to ensure that they are 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.
Charger Highway	The loading ratio guidelines do not apply because the design does not propose an infiltration BMP.
Locke Mountain Road	The loading ratio guidelines do not apply because the design does not propose an infiltration BMP.
Juniata Valley Road	The loading ratio guidelines do not apply because the design does not propose an infiltration BMP.
High Street	The loading ratio of 8:1 (drainage area:infiltration area) is exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. In addition, the impervious loading ratio was further reduced, with a goal of achieving no greater than 3:1 because the site is located in an area of karst terrain. The impervious loading ratio for the site is 1.7:1. The drainage area loading ratio for the site is 15.3:1. Although the detained drainage area to the PCSM BMP is slightly above 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 infiltrate within 72 hours. Based on sound engineering judgment of 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. A large portion of upslope runoff to the proposed infiltration berm has been diverted with a diversion 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 berm is not functioning properly, one of the ways to remedy the problem would be to expand the upslope diversion and further stabilize the area where the diversion berm outlets. A permit modification would need to be filed prior to expanding the upslope diversion.
Raystown Road	The loading ratio of 8:1 (drainage area:infiltration area) is exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. The impervious loading ratio for the site is 5:1. The drainage area loading ratio for the site is 20.9:1. Although the detained drainage area to the PCSM BMP is above 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 berms and infiltration trench has been defined in the application as the inability to pond upslope of the berm, or inability of the berms and trench to infiltrate within 72 hours. Based on sound engineering judgment of 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 berms or infiltration trench will fail as a result of the designed loading ratios. Runoff from the impervious area and upslope contributory drainage area will be dispersed over two infiltration berms and an infiltration trench. The infiltration berms and trench will be inspected regularly (at least 4 times per year) to ensure that they are 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.
Happy Hills Road	The loading ratio of 8:1 (drainage area:infiltration area) is minimially exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. In addition, the impervious loading ratio was further reduced, with a goal of achieving no greater than 3:1 because the site is located in an area of karst terrain. The impervious loading ratio for the site is 2.2:1. The drainage area loading ratio for the site is 9.0:1. Although the detained drainage area to the PCSM BMP is slightly above 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 infiltrate within 72 hours. Based on sound engineering judgment of 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. The infiltration berm and upslope soil amendment area 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 berm is not functioning properly or the soil amendment has become compacted, one of the ways to remedy the problem would be to construct upslope diversion and reapply the soil

	amendments as needed. A permit modification would need to be filed prior to constructing upslope diversion.
Hares Valley Road	The loading ratio of 8:1 (drainage area:infiltration area) is exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. The impervious loading ratio for the site is 1.7:1. The drainage area loading ratio for the site is 15.5:1. Although the detained drainage area to the PCSM BMP is above 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 BMPs. Failure of the proposed infiltration berms has been defined in the application as the inability to pond upslope of the berm or infiltrate within 72 hours. Based on sound engineering judgment of 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 berms will fail as a result of the designed loading ratios. Runoff from the impervious area and upslope contributory drainage area will be dispersed over five infiltration berms. The infiltration berms will be inspected regularly (at least 4 times per year) to ensure that they are 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.
Shade Valley Road	The maximum impervious loading ratio of 5:1 has been met. In addition, the impervious loading ratio was further reduced, with a goal of achieving no greater than 3:1 because the site is located in an area of karst terrain. The impervious loading ratio for Drainage Area 1 is 1.9:1. The impervious loading ratio for Drainage Area 2 is 1.2:1. The maximum Drainage Area loading ratio of 8:1 has been met in both drainage areas. The drainage area loading ratio for Drainage Area 1 is 5.7:1, and the drainage area loading ratio for Drainage Area 2 is 7.9:1.
Creek Road	The loading ratio guidelines do not apply because the design does not propose an infiltration BMP.
Wolf Bridge Road	The loading ratio guidelines do not apply because the design does not propose an infiltration BMP.
W. Trindle Road	The maximum impervious loading ratio of 5:1 has been met. In addition, the impervious loading ratio was further reduced, with a goal of achieving no

	greater than 3:1 because the site is located in an area of karst terrain. The impervious loading ratio for the site is 2.3:1. The maximum Drainage Area loading ratio of 8:1 has also been met. The drainage area loading ratio for the site is 7.5:1.
Arcona Road	The loading ratio of 8:1 (drainage area:infiltration area) is exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. In addition, the impervious loading ratio was further reduced, with a goal of achieving no greater than 3:1 because the site is located in an area of karst terrain. The impervious loading ratio for the site is 1.9:1. The drainage area loading ratio for the site is 13.5:1. Although the detained drainage area to the PCSM BMP is slightly above 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 infiltrate within 72 hours. Based on sound engineering judgment of 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. 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 berm is not functioning properly, one of the ways to remedy the problem would be to construct upslope diversion and stabilize the area where the diversion berm outlets. A permit modification would need to be filed prior to constructing upslope diversion.
N. Union Street	The loading ratio of 8:1 (drainage area:infiltration area) is exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. The impervious loading ratio for drainage area 1 is 3.1:1, and the impervious loading ratio for drainage area 2 is 3.5:1. The drainage area loading ratios for the site are 9.6:1 and 14.5:1, respectively. Although the detained drainage area to the PCSM BMP is slightly above 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 infiltrate within 72 hours. Based on sound engineering judgment of 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. The infiltration berms will be inspected regularly (at least 4 times per year) to ensure that they are 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 berm is 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.
Gates Road	The maximum impervious loading ratio of 5:1 has been met. The impervious loading ratio for the site is 0.7:1. The maximum drainage area loading ratio of 8:1 has also been met. The drainage area loading ratio for the site is 3.2:1.
Schaeffer Road	The maximum impervious loading ratio of 5:1 has been met. The impervious loading ratio for the site is 4.5:1. The site is located in an area of karst terrain, so the impervious loading ratio has been maximized to the extent practicable. The maximum drainage area loading ratio of 8:1 has also been met. The drainage area loading ratio for the site is 6.7:1.
Sinclair Road	The loading ratio of 8:1 (drainage area:infiltration area) is exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. The impervious loading ratio is 41:1, and the impervious loading ratio is 5:1. 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 infiltrate within 72 hours. Based on sound engineering judgment of 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. 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 berm is not functioning properly, one of the ways to remedy the problem would be to construct upslope diversion. The soil amendment area can also be amended over time if compaction occurs. A

	permit modification would need to be filed prior to constructing upslope diversion.
Hopeland Road	The loading ratio of 8:1 (drainage area:infiltration area) is exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. The impervious loading ratio for the site is 2.6:1. The drainage area loading ratio for the site is 13:1. 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 infiltrate within 72 hours. Based on sound engineering judgment of 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 three infiltration berms. The infiltration berms will be inspected regularly (at least 4 times per year) to ensure that they are 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.
Montello	The loading ratio of 8:1 (drainage area:infiltration area) is exceeded at the site. The 5:1 loading ratio (impervious area:infiltration area) has been met at the site. The impervious loading ratio for the site is 3.7:1. The impervious loading ratio was decreased to the maximum extent possible because the site is located within an area of karst terrain. The drainage area loading ratio for the site is 19.4:1. 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 berms and infiltration trench has been defined in the application as the inability to pond upslope of the berm, or inability of the berms and trench to infiltrate within 72 hours. Based on sound engineering judgment of 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 berms or infiltration trench will fail as a result of the designed loading ratios. Runoff from the impervious area and upslope contributory drainage area will be dispersed over two infiltration berms and an infiltration trench. The infiltration berms and trench will be inspected regularly (at least 4 times per year) to ensure that they are 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.
Morgantown Road	The loading ratio guidelines do not apply because the design does not propose an infiltration BMP.

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
Valley Forge Road	Blair	0.009	0.023	0.006	Infiltration Berm
Charger Highway Drainage Area 1	Blair	0.037	0.051	0.032	Slow Release Trench
Charger Highway Drainage Area 2	Blair	0.005	0.006	0.003	Slow Release Trench
Locke Mountain Road	Blair	0.048	0.060	0.043	Slow Release Trench
Juniata Valley Road	Blair	0.024	0.037	0.023	Slow Release Trench
High Street	Blair	0.017	0.031	0.004	Infiltration Berm
Raystown Road	Huntingdon	0.040	0.055	0.016	Infiltration Trench and Infiltration Berm
Happy Hills Road	Huntingdon	0.051	0.066	0.030	Infiltration Berm

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
Hares Valley Road	Huntingdon	0.005	0.006	0.003	Infiltration Berm
Shade Valley Road Drainage Area 1	Huntingdon	0.036	0.051	0.033	Infiltration Berm
Shade Valley Road Drainage Area 2	Huntingdon	0.076	0.097	0.060	Infiltration Berm
Creek Road	Cumberland	0.064	0.078	0.050	Slow Release Trench
Wolf Bridge Road	Cumberland	0.011	0.025	0.009	Slow Release Trench
W. Trindle Road	Cumberland	0.028	0.051	0.023	Infiltration Trench
Arcona Road	Cumberland	0.017	0.037	0.000	Infiltration Berm
N. Union Street Drainage Area 1	Dauphin	0.004	0.009	0.001	Infiltration Berm
N. Union Street Drainage Area 2	Dauphin	0.004	0.009	0.001	Infiltration Berm
Gates Road	Dauphin	0.020	0.034	0.015	Infiltration Berm
Schaeffer Road	Lebanon	0.017	0.033	0.000	Infiltration Berm
Sinclair Road	Lebanon	0.021	0.041	0.010	Infiltration Berm
Hopeland Road	Lebanon	0.073	0.089	0.066	Infiltration Berm
Montello	Berks	0.043	0.088	0.024	Infiltration Trench and Infiltration Berm
Morgantown Road	Berks	0.031	0.065	0.034	Slow Release Trench

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)
Valley Forge Road	0.276	0.185	2.141	1.546	5.441	3.956	7.280	7.224
Charger Highway Drainage Area 1	1.348	1.021	3.025	2.291	5.326	5.263	6.505	6.368
Charger Highway Drainage Area 2	0.126	0.099	0.302	0.222	0.547	0.392	0.672	0.668
Locke Mountain Road	1.688	1.409	3.430	2.863	5.756	5.515	6.933	6.595

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	
Juniata Valley Road	0.463	0.245	1.196	0.664	2.233	2.120	2.770	2.695
High Street	0.223	0.129	1.984	1.142	5.319	3.063	7.172	4.129
Raystown Road	1.963	1.062	4.662	3.707	8.458	6.982	10.42	10.05
Happy Hills Road	3.106	2.122	6.560	4.482	11.22	9.979	13.61	12.37
Hares Valley Road	0.243	0.203	1.283	0.474	3.041	1.183	4.029	2.464
Shade Valley Road Drainage Area 1	1.210	0.970	3.035	2.432	5.782	4.632	7.344	5.884
Shade Valley Road Drainage Area 2	2.266	2.053	5.933	4.955	11.50	9.295	14.68	11.74
Creek Road	2.510	2.048	5.196	4.238	9.506	9.308	12.05	11.69
Wolf Bridge Road	0.120	0.110	0.805	0.630	2.272	1.699	3.235	2.396
W. Trindle Road	0.473	0.277	3.097	2.558	8.505	7.051	11.99	9.992
Arcona Road	0.461	0.342	3.029	2.241	8.406	6.155	11.87	9.553
N. Union Street Drainage Area 1	0.000	0.000	0.000	0.000	0.013	0.010	0.055	0.045
N. Union Street Drainage Area 2	0.000	0.000	0.000	0.000	0.012	0.008	0.081	0.050
Gates Road	0.471	0.344	2.571	1.875	6.376	4.650	8.660	6.316
Schaeffer Road	0.448	0.352	2.499	1.966	6.205	4.882	8.378	6.592
Sinclair Road	0.705	0.270	2.918	1.614	6.523	5.353	8.577	7.739
Hopeland Road	1.563	1.222	4.707	3.679	9.509	7.433	12.15	11.97
Montello	1.575	1.463	8.136	6.754	19.26	16.55	25.57	24.69
Morgantown Road	1.490	0.454	9.557	7.173	23.26	21.57	30.82	29.83

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

5.0 REFERENCES

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Receiving Waters Table

Pennsylvania Pipeline Project

Southwest Region

Stream Name	County	Township	Chapter 93 Designated Use (Existing Use - if applicable)	Chapter 93 Code	Siltation Impaired
Chartiers Run	Washington	Chartiers	WARM WATER FISHES	WWF	Yes
UNT to Chartiers Run (4)	Washington	Chartiers	WARM WATER FISHES	WWF	Yes
Westland Run	Washington	Chartiers	WARM WATER FISHES	WWF	Yes
Chartiers Creek	Washington	Chartiers	WARM WATER FISHES	WWF	Yes
UNT to Chartiers Creek	Washington	Chartiers	WARM WATER FISHES	WWF	Yes
UNT to Chartiers Creek (3)	Washington	North Strabane	WARM WATER FISHES	WWF	Yes
Little Chartiers Creek	Washington	North Strabane	HIGH QUALITY-WARM WATER FISHES	HQ	No
UNT to Little Chartiers Creek (16)	Washington	North Strabane	HIGH QUALITY-WARM WATER FISHES	HQ	No
UNT to Peters Creek (6)	Washington	Nottingham	TROUT STOCKING	TSF	No
Peters Creek	Washington	Nottingham	TROUT STOCKING	TSF	No
UNT to Mingo Creek (9)	Washington	Nottingham	HIGH QUALITY-TROUT STOCKING	HQ	No
UNT to Mingo Creek (3)	Washington	Union	HIGH QUALITY-TROUT STOCKING	HQ	No
Froman Run	Washington	Union	TROUT STOCKING	TSF	No
UNT to Froman Run (3)	Washington	Union	TROUT STOCKING	TSF	No
Mongahela River	Washington	Union	WARM WATER FISHES	WWF	No
Monongahela River	Allegheny	Forward	WARM WATER FISHES	WWF	No
UNT to Bunola Run (4)	Allegheny	Forward	WARM WATER FISHES	WWF	No
Bunola Run	Allegheny	Forward	WARM WATER FISHES	WWF	No
Kelly Run	Allegheny	Forward	WARM WATER FISHES	WWF	No
UNT to Kelly Run	Allegheny	Forward	WARM WATER FISHES	WWF	No
UNT to Perry Mill Run	Allegheny	Forward	WARM WATER FISHES	WWF	No
Perry Mill Run	Allegheny	Forward	WARM WATER FISHES	WWF	No
Sunfish Run	Allegheny	Forward	WARM WATER FISHES	WWF	No
UNT to Sunfish Run (5)	Allegheny	Forward	WARM WATER FISHES	WWF	No
UNT to Beckets Run (8)	Allegheny	Forward	WARM WATER FISHES	WWF	Yes
UNT to Gillespie Run (3)	Allegheny	Elizabeth	WARM WATER FISHES	WWF	No
Long Hollow	Allegheny	Elizabeth	WARM WATER FISHES	WWF	Yes
UNT to Pollock Run (2)	Allegheny	Elizabeth	WARM WATER FISHES	WWF	Yes
UNT to Pollock Run (2)	Westmoreland	Rostraver	WARM WATER FISHES	WWF	Yes
Pollock Run	Westmoreland	Rostraver	WARM WATER FISHES	WWF	Yes
Youghiogheny River	Westmoreland	Rostraver	WARM WATER FISHES	WWF	No
Youghiogheny River	Westmoreland	South Huntingdon	WARM WATER FISHES	WWF	No

Receiving Waters Table

Pennsylvania Pipeline Project

Southwest Region

Stream Name	County	Township	Chapter 93 Designated Use (Existing Use - if applicable)	Chapter 93 Code	Siltation Impaired
UNT to Sewickley Creek (2)	Westmoreland	South Huntingdon	WARM WATER FISHES	WWF	No
Sewickley Creek	Westmoreland	Sewickley	WARM WATER FISHES	WWF	No
UNT to Sewickley Creek (3)	Westmoreland	Sewickley	WARM WATER FISHES	WWF	No
UNT to Kellys Run	Westmoreland	Sewickley	WARM WATER FISHES	WWF	Yes
Little Sewickley Creek	Westmoreland	Sewickley	TROUT STOCKING	TSF	Yes
UNT to Little Sewickley Creek (7)	Westmoreland	Sewickley	TROUT STOCKING	TSF	Yes
Little Sewickley Creek	Westmoreland	Hempfield	TROUT STOCKING	TSF	Yes
UNT to Little Sewickley Creek (15)	Westmoreland	Hempfield	TROUT STOCKING	TSF	Yes
UNT to Brush Creek (6)	Westmoreland	Hempfield	TROUT STOCKING	TSF	No
Brush Creek	Westmoreland	Jeannette	TROUT STOCKING	TSF	No
UNT to Brush Creek	Westmoreland	Penn	TROUT STOCKING	TSF	No
UNT to Bushy Run (12)	Westmoreland	Penn	TROUT STOCKING	TSF	Yes
Bushy Run	Westmoreland	Penn	TROUT STOCKING	TSF	Yes
UNT to Turtle Creek (2)	Westmoreland	Penn	TROUT STOCKING	TSF	Yes
UNT to Turtle Creek (3)	Westmoreland	Murrysville	TROUT STOCKING	TSF	Yes
Turtle Creek	Westmoreland	Murrysville	TROUT STOCKING	TSF	Yes
Thorn Run	Westmoreland	Salem	HIGH QUALITY-COLD WATER FISHES	HQ	Yes
UNT to Beaver Run (19)	Westmoreland	Salem	HIGH QUALITY-COLD WATER FISHES	HQ	Yes
Beaver Run	Westmoreland	Salem	HIGH QUALITY-COLD WATER FISHES	HQ	Yes
UNT to Porters Run (12)	Westmoreland	Salem	HIGH QUALITY-COLD WATER FISHES	HQ	No
Porters Run	Westmoreland	Salem	HIGH QUALITY-COLD WATER FISHES	HQ	No
UNT to Loyalhanna Creek (12)	Westmoreland	Salem	HIGH QUALITY-COLD WATER FISHES	HQ	No
UNT to Serviceberry Run (2)	Westmoreland	Salem	HIGH QUALITY-WARM WATER FISHES	HQ	No
UNT to Serviceberry Run (4)	Westmoreland	Loyalhanna	HIGH QUALITY-WARM WATER FISHES	HQ	No
Serviceberry Run	Westmoreland	Loyalhanna	HIGH QUALITY-WARM WATER FISHES	HQ	No
UNT to Loyalhanna Lake (2)	Westmoreland	Loyalhanna	HIGH QUALITY-WARM WATER FISHES	HQ	No
UNT to Loyalhanna Creek (8)	Westmoreland	Loyalhanna	WARM WATER FISHES	WWF	No
Loyalhanna Creek	Westmoreland	Loyalhanna	WARM WATER FISHES	WWF	No
UNT to Boatyard Run (8)	Westmoreland	Loyalhanna	COLD WATER FISHES	CWF	No
Boatyard Run	Westmoreland	Derry	COLD WATER FISHES	CWF	No
UNT to Boatyard Run (12)	Westmoreland	Derry	COLD WATER FISHES	CWF	No
UNT to Spruce Run (6)	Westmoreland	Derry	HIGH QUALITY-COLD WATER FISHES	HQ	Yes

Receiving Waters Table

Pennsylvania Pipeline Project

Southwest Region

Stream Name	County	Township	Chapter 93 Designated Use (Existing Use - if applicable)	Chapter 93 Code	Siltation Impaired
Spruce Run	Westmoreland	Derry	HIGH QUALITY-COLD WATER FISHES	HQ	Yes
UNT to Conemaugh River (37)	Westmoreland	Derry	COLD WATER FISHES	CWF	Yes
Conemaugh River	Westmoreland	Derry	WARM WATER FISHES	WWF	Yes
Conemaugh River	Indiana	Burrell	WARM WATER FISHES	WWF	No
UNT to Conemaugh River (5)	Indiana	Burrell	COLD WATER FISHES	CWF	No
UNT to Blacklick Creek (21)	Indiana	Burrell	COLD WATER FISHES	CWF	Yes
UNT to Toms Run (9)	Indiana	Burrell	COLD WATER FISHES- TROUT STOCKING	CWF-TSF	No
Toms Run	Indiana	Burrell	COLD WATER FISHES- TROUT STOCKING	CWF-TSF	No
UNT to Roaring Run (6)	Indiana	West Wheatfield	COLD WATER FISHES	CWF	No
Roaring Run	Indiana	West Wheatfield	COLD WATER FISHES	CWF	No
UNT to Conemaugh River (2)	Indiana	West Wheatfield	COLD WATER FISHES	CWF	No
West Branch Richards Run	Indiana	West Wheatfield	COLD WATER FISHES	CWF	No
UNT to West Branch Richards Run (4)	Indiana	West Wheatfield	COLD WATER FISHES	CWF	No
UNT to East Branch Richards Run (7)	Indiana	West Wheatfield	COLD WATER FISHES	CWF	No
East Branch Richards Run	Indiana	West Wheatfield	COLD WATER FISHES	CWF	No
UNT to Conemaugh River (31)	Indiana	East Wheatfield	COLD WATER FISHES	CWF	No
UNT to Findley Run (15)	Indiana	East Wheatfield	HIGH QUALITY-COLD WATER FISHES	HQ	No
Findley Run	Indiana	East Wheatfield	HIGH QUALITY-COLD WATER FISHES	HQ	No
UNT to Findley Run (10)	Cambria	Jackson	HIGH QUALITY-COLD WATER FISHES	HQ	No
UNT to Laurel Run (10)	Cambria	Jackson	HIGH QUALITY-COLD WATER FISHES	HQ	No
Laurel Run	Cambria	Jackson	HIGH QUALITY-COLD WATER FISHES	HQ	No
Hinckston Run	Cambria	Jackson	COLD WATER FISHES	CWF	No
UNT to Hinckston Run (10)	Cambria	Jackson	COLD WATER FISHES	CWF	No
UNT to Saltlick Run (24)	Cambria	Jackson	HIGH QUALITY-COLD WATER FISHES	HQ	No
Saltlick Run	Cambria	Jackson	HIGH QUALITY-COLD WATER FISHES	HQ	No
Stewart Run	Cambria	Cambria	HIGH QUALITY-COLD WATER FISHES	HQ	No
UNT to Stewart Run (7)	Cambria	Cambria	HIGH QUALITY-COLD WATER FISHES	HQ	No
UNT to Roaring Run (8)	Cambria	Cambria	COLD WATER FISHES	CWF	No
Roaring Run	Cambria	Cambria	COLD WATER FISHES	CWF	No
Howells Run	Cambria	Cambria	COLD WATER FISHES	CWF	No
UNT to Howells Run (20)	Cambria	Cambria	COLD WATER FISHES	CWF	No
Sanders Run	Cambria	Cambria	COLD WATER FISHES	CWF	No

Receiving Waters Table

Pennsylvania Pipeline Project

Southwest Region

Stream Name	County	Township	Chapter 93 Designated Use (Existing Use - if applicable)	Chapter 93 Code	Siltation Impaired
UNT to North Branch Little Conemaugh (13)	Cambria	Munster	COLD WATER FISHES	CWF	No
North Branch Little Conemaugh River	Cambria	Munster	COLD WATER FISHES	CWF	No
UNT to Noels Creek (19)	Cambria	Munster	HIGH QUALITY-COLD WATER FISHES	HQ	No
Noels Creek	Cambria	Munster	HIGH QUALITY-COLD WATER FISHES	HQ	No
UNT to Little Conemaugh River (15)	Cambria	Cresson	COLD WATER FISHES	CWF	No
Little Conemaugh River	Cambria	Cresson	COLD WATER FISHES	CWF	No
Burgoon Run	Cambria	Cresson	COLD WATER FISHES	CWF	No
UNT to Burgoon Run (5)	Cambria	Cresson	COLD WATER FISHES	CWF	No
UNT to Bear Rock Run (9)	Cambria	Cresson	COLD WATER FISHES	CWF	No
UNT to Bear Rock Run	Cambria	Washington	COLD WATER FISHES	CWF	No
UNT to Blair Run (3)	Cambria	Washington	COLD WATER FISHES	CWF	No

Receiving Wetlands Table
Pennsylvania Pipeline Project
Southwest Region

Municipality	Receiving Water	Number of Wetlands	Number of EV Wetlands (Classification)
WASHINGTON COUNTY			
Chartiers	UNT to Chartiers Run	10	0
North Strabane	UNT to Chartiers Creek	1	0
North Strabane	UNT to Little Chartiers Creek	7	0
Nottingham	UNT to Peters Creek	2	0
Nottingham	UNT to Mingo Creek	4	0
Union	UNT to Mingo Creek	1	0
ALLEGHENY COUNTY			
Forward	UNT to Monongahela River	1	0
Forward	UNT to Bunola Run	2	0
Elizabeth	UNT to Gillespie Run	1	0

Receiving Wetlands Table
Pennsylvania Pipeline Project
Southwest Region

Municipality	Receiving Water	Number of Wetlands	Number of EV Wetlands (Classification)
WESTMORELAND COUNTY			
South Huntingdon	UNT to Sewickley Creek	4	0
Sewickley	UNT to Sewickley Creek	1	0
Sewickley	UNT to Kelly Run	1	0
Sewickley	UNT to Little Sewickley Creek	1	0
Hempfield	UNT to Little Sewickley Creek	7	0
Hempfield	UNT to Brush Creek	1	0
Penn	UNT to Brush Creek	10	0
Murrysville	UNT to Turtle Creek	1	0
Salem	UNT to Thorn Run	4	0
Salem	UNT to Beaver Run	19	0
Salem	UNT to Porters Run	14	0
Salem	UNT to Loyalhanna Creek	2	0
Salem	UNT to Serviceberry Run	2	0
Loyalhanna	UNT to Serviceberry Run	8	0
Loyalhanna	UNT to Loyalhanna Creek	5	0
Loyalhanna	UNT to Boatyard Run	7	0
Derry	UNT to Boatyard Run	5	0
Derry	UNT to Spruce Run	1	0
Derry	UNT to Conemaugh River	29	0
INDIANA COUNTY			
Burrel	UNT to Conemaugh River	6	0
Burrel	UNT to Blacklick Creek	18	0
Burrel	UNT to Toms Run	2	1(Wild Trout)
West Wheatfield	UNT to Roaring Run	2	0
West Wheatfield	UNT to Conemaugh River	3	0
West Wheatfield	UNT to West Branch Richards Run	6	0
West Wheatfield	UNT to East Branch Richards Run	13	0
East Wheatfield	UNT to East Branch Richards Run	5	0
East Wheatfield	UNT to Conemaugh River	12	4 (Wild Trout)
East Wheatfield	UNT to Findley Run	15	8 (Wild Trout)

Receiving Wetlands Table
Pennsylvania Pipeline Project
Southwest Region

Municipality	Receiving Water	Number of Wetlands	Number of EV Wetlands (Classification)
CAMBRIA COUNTY			
Jackson	UNT to Findley Run	4	2 (Wild Trout)
Jackson	UNT to Laurel Run	7	3 (Wild Trout)
Jackson	UNT to Hinckston Run	21	0
Jackson	UNT to Saltlick Run	17	4 (Wild Trout)
Cambria	UNT to Stewart Run	26	5 (Wild Trout)
Cambria	UNT to Roaring Run	4	0
Cambria	UNT to Howells Run	11	1 (EV Plant)
Munster	UNT to North Branch Conemaugh River	12	0
Munster	UNT to Noels Creek	10	0
Cresson	UNT to Little Conemaugh River	19	1 (EV Plant)
Cresson	UNT to Burgoon Run	4	0
Cresson	UNT to Bear Rock Run	7	0
Washington	UNT to Blair Run	7	1 (EV Plant) 3 (Wild Trout)