Attachment 45 to PLA-6219
Post Construction Stormwater Management Plan for PPL SSES Stormwater Upgrades and 3-Acre Gravel Overflow Parking Lot Construction

(NRC Document Request 100)

Post Construction Stormwater Management Plan

for PPL SSES Stormwater Upgrades and 3-acre Gravel Overflow Parking Lot Construction

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Post Construction Stormwater Management Plan

for PPL SSES Stormwater Upgrades and 3-acre Gravel Overflow Parking Lot Construction

This PCSM Plan is designed to maximize infiltration technologies, minimize point source discharges to surface waters, preserve the integrity of stream channels, and protect the physical, biological, and chemical qualities of the receiving surface water.

Project Narrative

This project includes stormwater upgrades to an existing 12.7-acre parking lot and construction of a 3.2 acre gravel overflow parking area. The stormwater upgrades are a voluntary action taken to reduce stormwater discharges, improve water quality, and reduce significant erosion currently present at the project location. The existing lot has no existing stormwater management practices in place. Under the current conditions, runoff sheet flows until it concentrates at low points on the steep embankment surrounding the parking area. It has formed a series of deep (8 feet+) gullies that continue to erode. Flow from the parking lot then enters an existing sediment/detention basin constructed at the time the PPL Susquehanna Steam Electric Station was constructed in the late 1970's. Sediment from the erosion on the parking area accumulates in the existing basin reducing its capacity and causing ongoing maintenance issues. The goal of this project is to improve stormwater management at the parking lot level, eliminate erosion on the parking lot margins, provide water quality treatment for the stormwater prior to discharging to the existing basin, and reduce peak flows from the parking lot.

The overflow parking area (3.2 acres) will remain pervious as it will consist of a gravel base surfaced with gravel. A well-vegetated buffer and existing drainage ways will remain around the parking area. This buffer is located on Chenango Hydrologic Soil Group A soils. Runoff from the gravel parking area will enter the vegetated buffer as sheet flow and shallow concentrated flow allowing the opportunity for water quality treatment and infiltration.

The existing peak discharge from the 2-year storm for the project area is 33 cfs. After construction and installation of stormwater BMP's the peak discharge will be 10 cfs resulting in a 23 cfs reduction in the 2-year storm peak discharge.

Upon completion of construction, all disturbed areas will be permanently stabilized with either vegetation or stone.

Impervious Area

The proposed construction activities will result in no increase in impervious surface on the project site. All disturbed areas will be revegetated or stabilized with stone. The proposed overflow lot will be constructed with gravel and remain a pervious surface. *The existing project area consists of 12.7 acres of existing parking of which 9.3 acres is impervious.* The proposed stormwater upgrades for this parking area will improve water quality, reduce peak discharge, and eliminate erosion on the existing parking lot margins.

Post Construction Stormwater BMP's

Infiltration Trenches

A total of 1,325 feet of infiltration trench will be constructed to collect stormwater flow from the existing parking area. No credit other than volume storage is claimed for the trenches as the soil conditions underlying the trench are highly variable making accurate infiltration testing impractical. The trenches will impart some water quality improvement and volume reduction. However, the rate of infiltration from the trenches is unknown. The storage volume in the trenches is 0.02 acre-feet. Water quality improvement will be realized as runoff passes through the warm season grass buffer planted along both sides of the trench.

Detention Basins

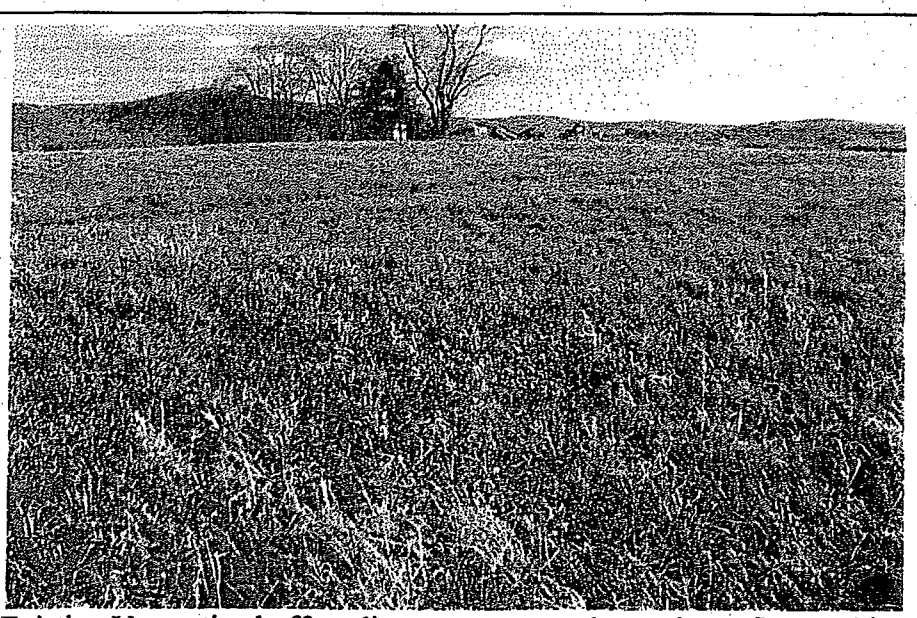
Two detention basins are proposed for construction at the parking lot level. The detention basins are designed for water quality improvement, retention, and peak reduction. The detention basins will retain 0.41 acre-feet of water below the outlet. Additional detention volume and outlet structures will temporarily detain discharge from large storms resulting in significant peak discharge reductions for storms up to and including the 100-year storm. The floors and side slopes of the detention basins will be planted with a wet meadow, facultative wetland seed mix including the following:

20.0%	Elymus virginicus	Virginia Wild Rye
19.0%	Carex vulpinoidea	Fox Sedge
6.0%	Scirpus atrovirens	Green Bulrush
5.0%	Heliopsis helianthoides	Ox-Eye Sunflower
5.0%	Verbena hastata	Blue Vervain
3.0%	Carex lurida	Lurid/Shallow Sedge
3.0%	Eupatorium perfoliatum	Boneset
3.0%	Gylceria grandis	American Mannagrass
3.0%	Glyceria striata	Fowl Mannagrass
3.0%	Juncus effusus	Soft Rush
3.0%	Onoclea sensibilis	Sensitive Fern
2.0%	Carex comosa	Cosmos/Bristly Sedge
2.0%	Carex lupulina	Hop Sedge
2.0%	Carex scoparia	Blunt Broom Grass
2.0%	Helenium autumnale	Common Sneezeweed
2.0%	Iris versicolor	Blue Flag
2.0%	Juncus tenuis, PA Ecotype	Path Rush, PA Ecotype
2.0%	Mimulus ringens	Square Stemmed Monkey Flower
2.0%	Scirpus polyphyllus	Many Leaved Bulrush
2.0%	Vernonia gigantea	Giant Ironweed
1.0%	Carex stipata	Awl Sedge
1.0%	Carex tribuloides	Bristlebract Sedge
1.0%	Eupatorium fistulosum	Joe Pye Weed
1.0%	Geum laciniatum	Rough Avens
1.0%	Glyceria canadensis	Rattlesnake Grass
1.0%	Lilium superbum	Turk's Cap Lilly
1.0%	Penthorum sedoides	Ditch Stonecrop

1.0%	Senna hebecarpa	Wild Senna
1.0%	Solidago patula	Rough Leaved Goldenrod

Vegetated Buffer

An existing vegetated buffer adjacent to the 3.2 acre gravel parking area will be preserved. This area of densely vegetated grasses will improve water quality. Additionally, it is underlain by a hydrologic group A soil providing the opportunity for infiltration in smaller storms.



Existing Vegetative buffer adjacent to proposed gravel overflow parking

Volume of Stormwater Infiltration

While some infiltration will occur in both the infiltration trenches and bioswales, no credit is claimed for infiltration as these practices will be constructed in an area that was previously filled. The soil conditions are non-uniform and do not afford the opportunity to conduct reliable infiltration testing that would yield an accurate infiltration volume for the BMP's.

Operation and Maintenance Procedures

All Stormwater BMP's should be inspected at least quarterly and after every storm with a precipitation total greater than 1 inch.

For the Infiltration Trenches

- Each Infiltration Trench should be inspected for excessive debris and sediment accumulation at least four times per year, as well as after every storm greater than 1 inch. Any excessive material should be removed and disposed of properly.

- 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.
- Vegetative cover should be maintained at a minimum of 95 percent. If vegetative cover has been reduced by 10%, vegetation should be reestablished.

For the detention basins.

- All basin structures expected to receive and/or trap debris and sediment should be inspected for clogging and excessive debris and sediment accumulation at least four times per year, as well as after every storm greater than 1 inch. Any excessive material should be removed and disposed of properly.
- Structures include basin bottoms, trash racks, outlet structures, riprap or gabion structures, and inlets.
- Sediment removal should be conducted when the basin is completely dry. Sediment should be disposed of properly and once sediment is removed, disturbed areas need to be immediately stabilized and revegetated.
- Mowing and/or trimming of vegetation should be performed as necessary to sustain the system, but all detritus should be removed from the basin.
- Vegetated areas should be inspected annually for erosion.
- Vegetated areas should be inspected annually for unwanted growth of exotic/invasive species.
- Vegetative cover should be maintained at a minimum of 95 percent. If vegetative cover has been reduced by 10%, vegetation should be reestablished.

For the Existing Vegetated Buffer

- Vegetated areas should be inspected annually for erosion.
- Vegetated areas should be inspected annually for unwanted growth of exotic/invasive species.
- Vegetative cover should be maintained at a minimum of 95 percent. If vegetative cover has been reduced by 10%, vegetation should be reestablished.

Supporting Calculations and Measurements

While supporting calculations are not required according to Section E.I .e. - no increase in impervious surface, a summary of stormwater computations is provided as a reference because a major portion of the project is dedicated to stormwater upgrades and significant reductions in peak runoff will be realized.

The design storm is a 2-year, 24-hour storm using the NRCS Type II Storm Distribution. The rainfall amount for the 2-year storm this location is 2.9 inches.

Infiltration trench storage
1325 feet long x 3 feet wide
0.5 feet of storage depth @ 40% void space
Storage volume = 1325x3x0.5x0.4 = 795 cubic feet = .02 acre-feet

Detention Basins

See attached stage-storage & Stage-Discharge Tables and Discharge Summary

Rainfall-Runoff Modelling

See the attached model input summaries and model output for all project areas. Runoff modeling was completed using the NRCS Curve Number Method. A summary of curve numbers applied to the project areas is included with the model input summaries.

Summary of Discharge Volumes - 2-year NRCS Type II Storm

Proposed 3.2 acre GravelOverflow Parking Lot

		Area (acres)	Runoff Amount in inches	Volume (acre-feet)
Existing Conditions	Subarea 1	1.9	0.64	0.10
	Subarea 2	1.3	0.37	0.04
		3.2 acres		**0.14 Acre-Feet**
Proposed Conditions	Subarea 1	1.9	0.79	0.12
	Subarea 2	1.3	0.54	0.06
		3.2 acres		**0.18 Acre-Feet**

Existing Parking Lot

Existing Conditions - Area A	Paved	6.3	2.06	1.08
	Unpaved	1.57	0.59	0.08
		7.87 acres		**1.16 Acre-Feet**
Existing Conditions - Area B	Paved	3.0	2.04	0.51
	Unpaved	1.86	0.63	0.10
		4.86 acres		**0.61 Acre-Feet**

Total Existing Conditions Runoff Volume	**1.91 Acre-Feet**

Stormwater BMP's	**Retained and/or Infiltrated Volume**
Detention Basin 1 - storage below outlet	0.16 Acre-Feet
Detention Basin 2 - storage below outlet	0.25 Acre-Feet
Retention Volume in Infiltration/Stormwater Trench	0.02 Acre-Feet
Total Retained/Infiltrated Volume	**0.43 Acre-Feet**

Total Proposed Conditions Runoff Volume without BMP's	**1.95 Acre-Feet**
Total Proposed Conditions Runoff Volume with BMP's	**1.52 Acre-Feet**
Net Change in Runoff Volume from Existing Conditions	**0.39 Acre-Feet**

Existing and Proposed Stormwater Conditions - PPL SSES

Proposed Expansion Parking Area

Storm Frequency	1 year	2 year	5 year	10 year	25 year	50 year	100 year	Drainage Area
Existing Conditions	1.8	3.0	6.0	8.8	10.6	12.9	15.3	3.2 acres
Proposed Conditions	2.4	3.8	7.2	10.1	12.1	14.5	16.9	3.2 acres
Net Change Expansion Parking Area	0.6	0.8	1.2	1.4	1.5	1.6	1.7	
Existing Lot - Area A - Discharge from Detention Basin 2								
Existing Conditions	16.0	19.6	27.1	33.1	36.9	41.5	46.1	7.87 acres
With Stormwater Upgrades	3.1	3.6	5.1	5.9	11.1	15.3	19.7	7.87 acres
Net Change Area A	-12.9	-16.1	-21.9	-27.2	-25.8	-26.3	-26.5	
Existing Lot - Area B - Discharge from Detention Basin 1								
Existing Conditions	8.5	10.7	15.3	33.2	21.6	24.5	27.5	4.86 acres
With Stormwater Upgrades	2.3	2.6	6.3	11.3	13.5	18.2	23.1	4.86 acres
Net Change Area B	-6.2	-8.1	-9.0	-22.0	-8.1	-6.4	-4.5	
Net Change in Stormwater Discharge (peak cfs)	**-18.5**	**-23.3**	**-29.8**	**-47.8**	**-32.4**	**-31.1**	**-29.3**	

Summary of NRCS Curve Number Method Model Inputs for Existing Parking Lot Drainages

Rainfall Runoff Modeling was completed using HEC-HMS and the NRCS Curve Number Method Option. Routing was by the Lag Method. Retention was computed based on Stage-Volume curves for each basin. Discharge from the basins was computed by stage-discharge relationships for the outlet structures.

Area A

Paved Area

6.27 Acres
98 Weighted CN
12 minutes Tc

Unpaved Area

1.6 Acres
72 Weighted CN
8 minutes Tc

Junction 1 - All flows were routed to Junction 1 to provide a value for comparison of existing condition discharge to post construction discharge. Output at Junction 1 is provided as existing conditions discharge.

Area B

Paved Area

3.0 Acres
98 Weighted CN
11 minutes Tc

Unpaved Area

1.86 Acres
72 Weighted CN
9 minutes Tc

Junction 1 - All flows were routed to Junction 1 to provide a value for comparison of existing condition discharge to post construction discharge. Output at Junction 1 is provided as existing conditions discharge.

Post-Construction Model Inputs

Area A

Paved Area

6.27 Acres
98 Weighted CN
12 minutes Tc

Infiltration/Stormwater Trench 1 – Routing for new trench – routed using the Lag Method

18 minute Lag

Unpaved Area

1.6 Acres
72 Weighted CN
8 minutes Tc

Infiltration/Stormwater Trench 2

8 minute Lag

Detention Basin 2 – Detention Basin Routing using Stage-Discharge Curve

Area B

Paved Area

3.0 Acres
98 Weighted CN
11 minutes Tc

Infiltration/Stormwater Trench 1 – Routing for new trench – routed using the Lag Method

10 minutes Lag

Unpaved Area

1.86 Acres
72 Weighted CN
9 minutes Tc

Infiltration/Stormwater Trench 2

10 minutes Lag

Detention Basin 1 – Detention Basin Routing using Stage-Discharge Curve

Existing Parking Area A
Existing Conditions HEC-HMS Output

Project : Existing Cond Simulation Run : 2 year Junction: Junction-1

Start of Run :	01Jan2006, 00:00	Basin Model :	Existing Parking A
End of Run :	02Jan2006, 23:00	Meteorologic Model :	Met 2 yr
Execution Time :	01Nov2006, 09:13:16	Control Specifications :	Control 1

Volume Units : IN

Computed Results

Peak Outflow : 19.61 (CFS) Date/Time of Peak Outflow : 01Jan2006, 12:04
Total Outflow : 2.51 (IN)

Existing Parking Area A
Post Construction Conditions HEC-HMS Output

detention Basin 2

Project : Proposed Conditions - A Simulation Run : 2 year Reservoir: [redacted]

Start of Run :	01Jan2006, 00:00	Basin Model :	Existing Parking A
End of Run :	02Jan2006, 23:00	Meteorologic Model :	Met 2 yr
Execution Time :	01Nov2006, 09:38:18	Control Specifications :	Control 1

Volume Units : IN

Computed Results

Peak Inflow :	18.37 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:22
Peak Outflow :	3.55 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:49
Total Inflow :	2.51 (IN)	Peak Storage :	0.84 (AC-FT)
Total Outflow :	2.19 (IN)	Peak Elevation :	657.43 (FT)

Existing Parking Area B
Existing Conditions HEC-HMS Output

Project : Existing Lot B US Simulation Run : 2-year Junction: Junction-1

Start of Run :	01Jan2006, 00:00	Basin Model :	Existing Parking B
End of Run :	02Jan2006, 12:00	Meteorologic Model :	2-year
Execution Time :	02Nov2006, 11:38:55	Control Specifications :	Control 1

Volume Units : IN

Computed Results

Peak Outflow : 10.66 (CFS) Date/Time of Peak Outflow : 01Jan2006, 12:03

Total Outflow : 2.09 (IN)

Existing Parking Area B
Post Construction Conditions HEC-HMS Output

detention Basin 1

Project : Proposed Conditions Area B Simulation Run : 2-year Reservoir: [redacted]

Start of Run :	01Jan2006, 00:00	Basin Model :	Existing Parking B
End of Run :	02Jan2006, 12:00	Meteorologic Model :	2-year
Execution Time :	01Nov2006, 11:10:47	Control Specifications :	Control 1

Volume Units : IN

Computed Results

Peak Inflow :	10.70 (CFS)	Date/Time of Peak Inflow :	01Jan2006, 12:13
Peak Outflow :	2.55 (CFS)	Date/Time of Peak Outflow :	01Jan2006, 12:34
Total Inflow :	2.10 (IN)	Peak Storage :	0.34 (AC-FT)
Total Outflow :	1.90 (IN)	Peak Elevation :	650.80 (FT)

Detention Basin 1
Stage – Storage & Stage-Discharge Tables

TSA Tools	STAGE STORAGE COMPUTATIONS	FACILITY:ioswale
STORAGE 1.5 www.MdSWM.com		Project #: [redacted]
ENTER COMPANY NAME ON START SHEET	PROJECT: Detention Basin 1	Date: Designer: Checked:

STORAGE TABLE

Elevation (ft)	Area (sf)	Area (acre)	Change (ft)	Average Area (acre)	Incremental Volume (ac/ft)	Cumulative Volume (ac/ft)	Cumulative Volume (cf)
646	500	0.011					
646.5	2450	0.056	0.50	0.034	0.017	0.017	737.50
647.5	2613	0.060	1.00	0.058	0.058	0.075	3,269.00
648	3528	0.081	0.50	0.070	0.035	0.110	4,804.25
648.5	4356	0.100	0.50	0.090	0.045	0.156	6,775.25
649	4356	0.100	0.50	0.100	0.050	0.206	8,953.25
650	5271	0.121	1.00	0.111	0.111	0.316	13,766.75
651	6098	0.140	1.00	0.130	0.130	0.447	19,451.25
652	4705	0.108	1.00	0.124	0.124	0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75
						0.571	24,852.75

INTERPOLATIONS

Elevation	Volume		COMMENT	Volume		Elevation
[ft]	[acre-ft]	[ft³]		[acre-ft]	[ft³]	[ft]

Project : Existing Cond Simulation Run : 2 year Junction: Junction-1

Start of Run :	01Jan2006, 00:00	Basin Model :	Existing Parking A
End of Run :	02Jan2006, 23:00	Meteorologic Model :	Met 2 yr
Execution Time :	01Nov2006, 09:13:16	Control Specifications :	Control 1

Volume Units : IN

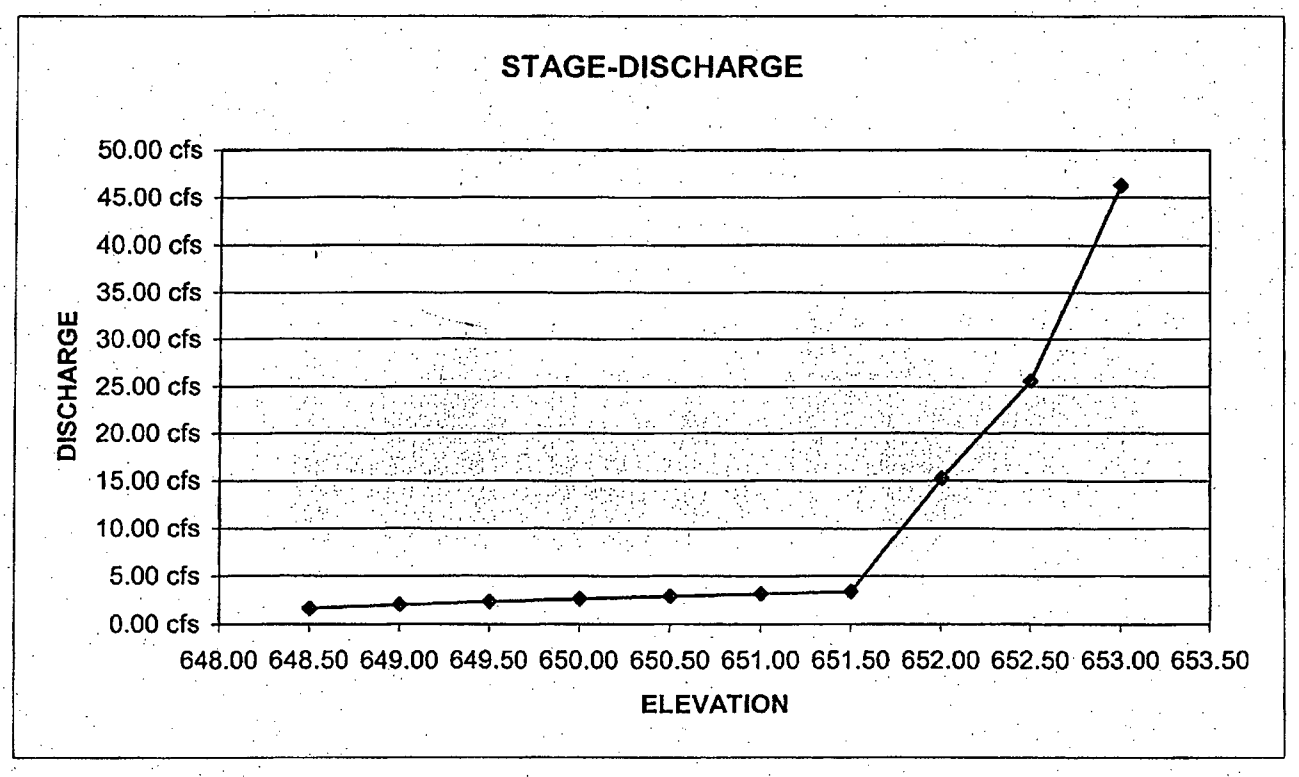
Computed Results

Peak Outflow : 19.61 (CFS) Date/Time of Peak Outflow : 01Jan2006, 12:04

Total Outflow : 2.51 (IN)

Detention Basin 1 - Stage-Discharge

Elevation	Discharge
648.50	1.61 cfs
649.00	2.00 cfs
649.50	2.33 cfs
650.00	2.61 cfs
650.50	2.87 cfs
651.00	3.11 cfs
651.50	3.33 cfs
652.00	15.20 cfs
652.50	25.55 cfs
653.00	46.25 cfs



Detention Basin 2
Stage – Storage & Stage-Discharge Tables

TSA Tools	STAGE STORAGE COMPUTATIONS	FACILITY:
STORAGE 1.5 www.MdSWM.com		Project #:
ENTER COMPANY NAME ON START SHEET	PROJECT: Detention Basin 2	Date: Designer: Checked:

STORAGE TABLE

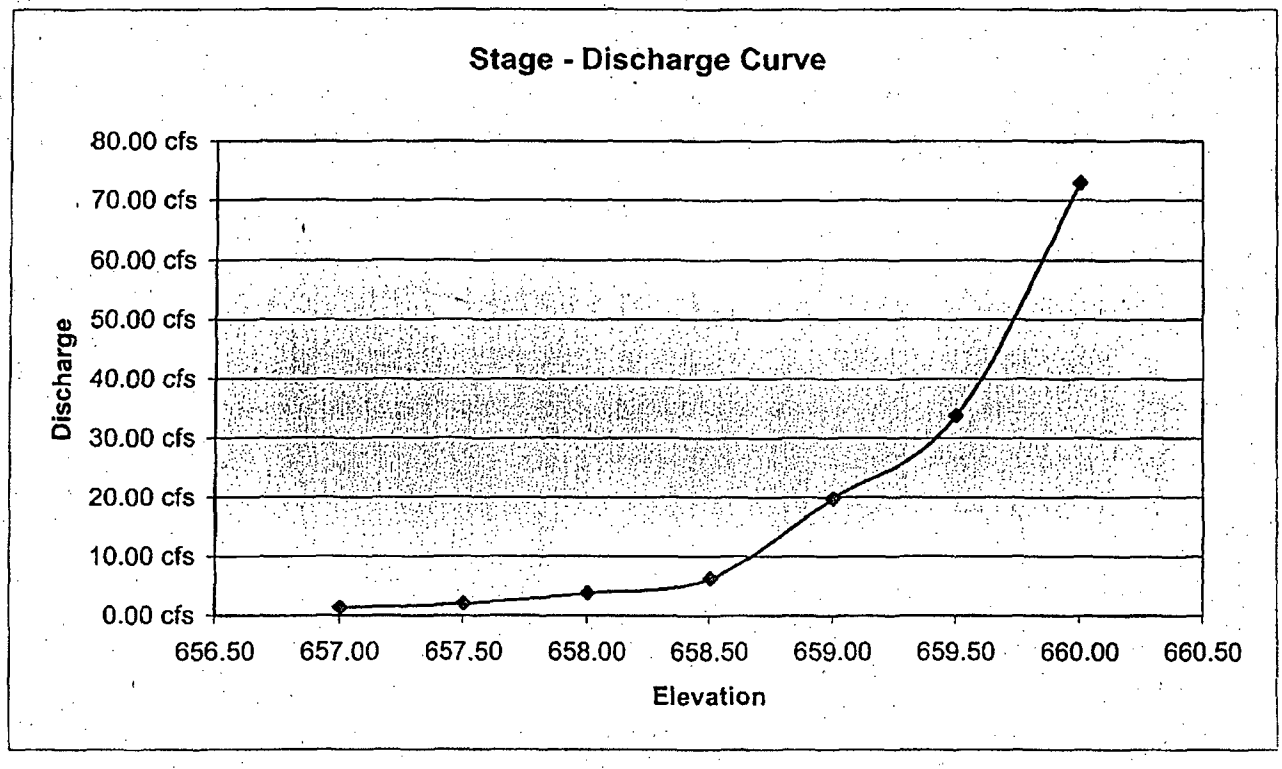
Elevation (ft)	Area (sf)	Area (acre)	Change (ft)	Average Area (acre)	Incremental Volume (ac/ft)	Cumulative Volume (ac/ft)	Cumulative Volume (cf)
655.5	10041	0.231					
656	10803	0.248	0.50	0.239	0.120	**0.120**	5,211.00
656.5	11587	0.266	0.50	0.257	0.129	**0.248**	10,808.50
657	12371	0.284	0.50	0.275	0.137	**0.386**	16,798.00
657.5	13177	0.303	0.50	0.293	0.147	**0.532**	23,185.00
658	13983	0.321	0.50	0.312	0.156	**0.688**	29,975.00
658.5	14832	0.340	0.50	0.331	0.165	**0.854**	37,178.75
659	15682	0.360	0.50	0.350	0.175	**1.029**	44,807.25
659.5	16553	0.380	0.50	0.370	0.185	**1.214**	52,866.00
660	17424	0.400	0.50	0.390	0.195	**1.409**	61,360.25
						1.409	61,360.25
						1.409	61,360.25
						1.409	61,360.25
						1.409	61,360.25
						1.409	61,360.25
						1.409	61,360.25
						1.409	61,360.25
						1.409	61,360.25
						1.409	61,360.25
						1.409	61,360.25

INTERPOLATIONS

Elevation	Volume		COMMENT	Volume		Elevation
[ft]	[acre·ft]	[ft³]		[acre·ft]	[ft³]	[ft]

Detention Basin 2 - Stage-Discharge

Elevation	Discharge
657.00	1.30 cfs
657.50	1.99 cfs
658.00	3.80 cfs
658.50	6.20 cfs
659.00	19.70 cfs
659.50	33.70 cfs
660.00	72.80 cfs



Proposed Gravel Parking Lot

Existing Conditions Hydrology

WinTR-55 Current Data Description

--- Identification Data ---

User: Jklotz
Project: Berwick Lot Expansion
SubTitle: E&S Runoff Calculations
State: Pennsylvania
County: Luzerne
Filename: C:\Landstudies\PPL Susquehanna Install\TR55 Files\Existing Expansion Lot.w55

Date: 11/14/2006
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
ELot1	Expansion lot portion 1	Outlet	1.9	72	0.118
ELot2	Expansion lot portion 2	Outlet	1.3	68	0.1

Total area: 3.20 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.9	3.9	4.7	5.2	5.8	6.4	2.4

Storm Data Source: Luzerne County, PA (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Berwick Lot Expansion
E&S Runoff Calculations
Luzerne County, Pennsylvania

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.9	3.9	4.7	5.2	5.8	6.4	2.4

Storm Data Source: Luzerne County, PA (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Berwick Lot Expansion
E&S Runoff Calculations
Luzerne County, Pennsylvania

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)	5-Yr (cfs)	10-Yr (cfs)	25-Yr (cfs)	50-Yr (cfs)	100-Yr (cfs)
SUBAREAS						
ELot1	1.96	3.84	5.54	6.65	8.02	9.43
ELot2	1.00	2.16	3.26	3.99	4.90	5.85
REACHES						
OUTLET	2.96	6.00	8.78	10.62	12.90	15.25

Berwick Lot Expansion
E&S Runoff Calculations
Luzerne County, Pennsylvania

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
ELot1	1.90	0.118	72	Outlet	Expansion lot portion 1
ELot2	1.30	0.100	68	Outlet	Expansion lot portion 2

Total Area: 3.20 (ac)

Berwick Lot Expansion
E&S Runoff Calculations
Luzerne County, Pennsylvania

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
ELot1							
SHEET	100	0.0300	0.050				0.061
SHALLOW	170	0.0300	0.050				0.017
SHALLOW	400	0.0300	0.050				0.040
					Time of Concentration		0.118
ELot2							
SHEET	100	0.0300	0.050				0.061
SHALLOW	140	0.0300	0.050				0.014
SHALLOW	240	0.0300	0.050				0.024
					Time of Concentration		0.1

Jklotz

Berwick Lot Expansion
E&S Runoff Calculations
Luzerne County, Pennsylvania

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
ELot1	Pasture, grassland or range	(poor)	A	1.5	68
	Pasture, grassland or range	(poor)	C	.4	86
	Total Area / Weighted Curve Number			1.9	72
ELot2	Pasture, grassland or range	(poor)	A	1.3	68
	Total Area / Weighted Curve Number			1.3	68

Proposed Gravel Parking Lot

Post-Construction Hydrology

WinTR-55 Current Data Description

--- Identification Data ---

User: Jklotz
Project: Berwick Lot Expansion
SubTitle: E&S Runoff Calculations
State: Pennsylvania
County: Luzerne
Filename: C:\Landstudies\PPL Susquehanna Install\TR55 Files\Proposed expansion lot1.w55

Date: 11/14/2006
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
ELot1	Expansion lot portion 1	Outlet	1.9	75	0.118
ELot2	Expansion lot portion 2	Outlet	1.3	72	0.100

Total area: 3.20 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.9	3.9	4.7	5.2	5.8	6.4	2.4

Storm Data Source: Luzerne County, PA (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

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Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.9	3.9	4.7	5.2	5.8	6.4	2.4

Storm Data Source: Luzerne County, PA (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

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Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)	5-Yr (cfs)	10-Yr (cfs)	25-Yr (cfs)	50-Yr (cfs)	100-Yr (cfs)
SUBAREAS						
ELot1	2.43	4.46	6.25	7.41	8.83	10.28
ELot2	1.38	2.71	3.91	4.69	5.66	6.66
REACHES						
OUTLET	3.80	7.16	10.14	12.08	14.47	16.90

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Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
ELot1	1.90	0.118	75	Outlet	Expansion lot portion 1
ELot2	1.30	0.100	72	Outlet	Expansion lot portion 2

Total Area: 3.20 (ac)

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Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
ELot1	Dirt (w/ right-of-way)	A	1.5	72
	Dirt (w/ right-of-way)	C	.4	87
	Total Area / Weighted Curve Number		1.9	75
ELot2	Dirt (w/ right-of-way)	A	1.3	72
	Total Area / Weighted Curve Number		1.3	72

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Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
ELot1							
SHEET	100	0.0300	0.050				0.061
SHALLOW	170	0.0300	0.050				0.017
SHALLOW	400	0.0300	0.050				0.040
					Time of Concentration		0.118
ELot2							
SHEET	100	0.0300	0.050				0.061
SHALLOW	140	0.0300	0.050				0.014
SHALLOW	240	0.0300	0.050				0.024
					Time of Concentration		0.100