CUMBERLAND COUNTY
CONSERVATION DISTRICT

DP/POA, EP Analysis & Module 2 Wetland Info

March 26, 2025

Cumberland County Conservation District

Conserving Natural Resources for Our Future

Discharge Point (DP)

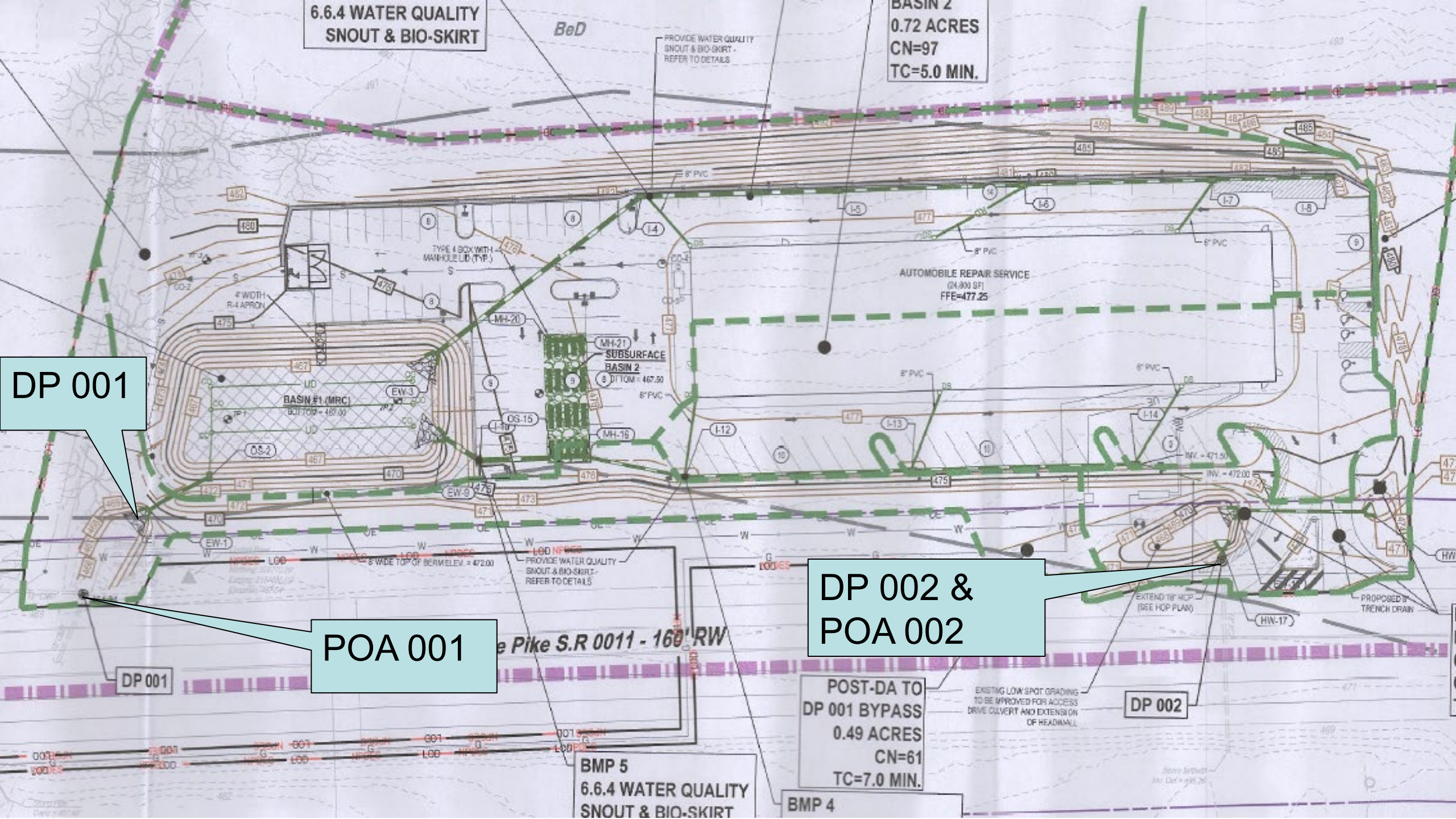
- **Discharge Point Locations and Receiving Waters, During Construction**. Identify all discharge points (DPs) and the receiving waters to which they discharge during construction. DPs are outlets of drainage areas within a project site. DPs aid in the accounting of stormwater entering, flowing through, and discharging from a project site for all flow regimes (sheet flow, shallow concentrated flow, and channel flow), regardless of whether the drainage area outlets to a surface water or areas other than surface waters. At least one DP must be identified for each surface water that receives stormwater discharges from the project site, even if concentrated flows are not anticipated. An EP Analysis must be conducted at DPs except when the criteria identified in the EP Analysis Instructions (3800-FM-BCW0271h) for conducting an EP Analysis are not met. DPs should not be confused with points of analysis (POAs), which are locations where the stormwater analysis required by 25 Pa. Code § 102.8(g) is performed. Information on POAs is requested in PCSM Module 2.

- **Discharge Point Locations and Receiving Waters, Post-Construction**. Provide the same information in this table as in question #1, except this table requests information concerning post-construction discharges. The information in this table may be the same as in question #1.

Point of Analysis (POA)

- Points of analysis are locations on a project site boundary, or at a surface water, that receive stormwater runoff from all, or a portion of, a project site and where stormwater management requirements of 25 Pa. Code § 102.8(g) must be demonstrated. POAs are selected considering both pre-construction and post-construction conditions. All runoff from a project site must be accounted for at one or more POAs. POAs may or may not be co-located with discharge points (DPs).

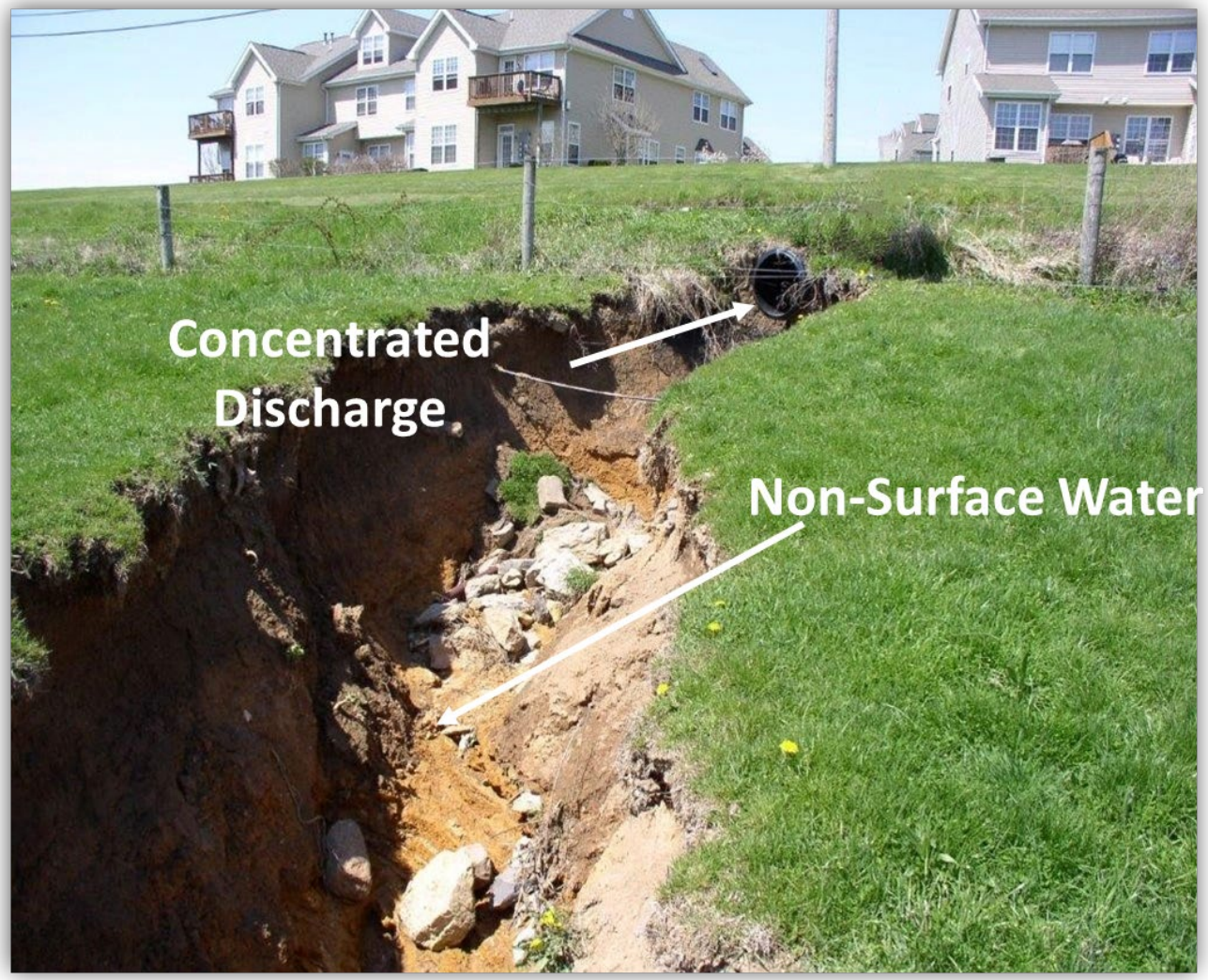
- **No. of Post-Construction POAs** – Select the number of post-construction points of analysis (POAs) that are proposed for a specific receiving surface water. The term "point of analysis" means a location on a project site boundary, or at a surface water, that receives stormwater runoff from all, or a portion of, a project site. A POA is the location where stormwater management requirements of 25 Pa. Code § 102.8(g) must be demonstrated. POAs are selected considering both pre-construction and post-construction conditions. All runoff from a project site must be accounted for at one or more POAs and any undetained areas.
  - **NOTE 6** – All POAs reported on the spreadsheet should be identified on PCSM Plan Drawings and PCSM Module 2.


6.6.4 WATER QUALITY
SNOUT & BIO-SKIRT
BeD
PROVIDE WATER QUALITY SNOUT & BIO-SKIRT - REFER TO DETAILS
BASIN 2
0.72 ACRES
CN=97
TC=5.0 MIN.
AUTOMOBILE REPAIR SERVICE
(24,800 SF)
FFE=477.25
SUBSURFACE
BASIN 2
BOTTOM = 467.50
BASIN #1 (MRC)
BOTTOM = 467.00
TYPE 4 BOX WITH MANHOLE LID (TYP.)
4' WIDTH R-4 APRON
8' WIDE TOP OF BERM ELEV. = 472.00
PROVIDE WATER QUALITY SNOUT & BIO-SKIRT - REFER TO DETAILS
DP 001
POA 001
DP 001
DP 002 &
POA 002
DP 002
POST-DA TO
DP 001 BYPASS
0.49 ACRES
CN=61
TC=7.0 MIN.
BMP 5
6.6.4 WATER QUALITY
SNOUT & BIO-SKIRT
BMP 4
EXISTING LOW SPOT GRADING TO BE IMPROVED FOR ACCESS DRIVE CULVERT AND EXTENSION OF HEADWALL
EXTEND 18" HDP (SEE HDP PLAN)
PROPOSED 8" TRENCH DRAIN
HW-17
Pike S.R 0011 - 160' RW

Erosion Potential Analysis (EP Analysis)

Purpose

- Prevent these situations
- Ensure existing flow paths will remain stable during and after construction



Erosion Potential Analysis (EP Analysis)

What is an EP Analysis

Evaluation of the overland flow path during a 10-year/24-hour event from a discharge point (DP) to a surface water or storm sewer

When is an EP Analysis Required

Required for concentrated flows that do not discharge directly to a surface water or storm sewer

When is an EP Analysis NOT Required

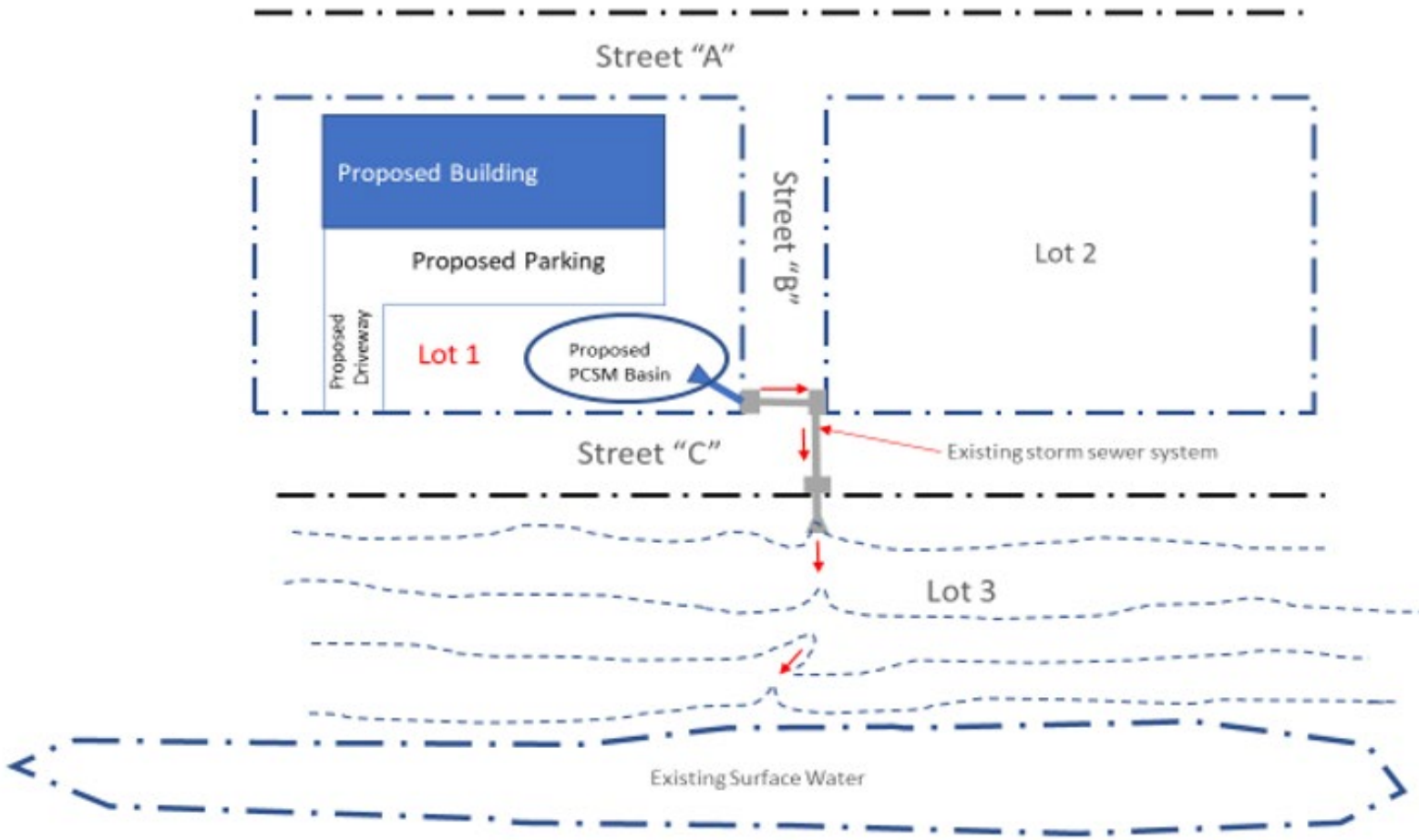
- A new channel will be designed and constructed to convey runoff in accordance with DEP's E&S Manual. If segments of the flow path will be partially improved, the segments of the flow path that will not be improved will need an EP Analysis.
- The permit application or NOI instructions do not require an EP Analysis

When is an EP Analysis NOT Required

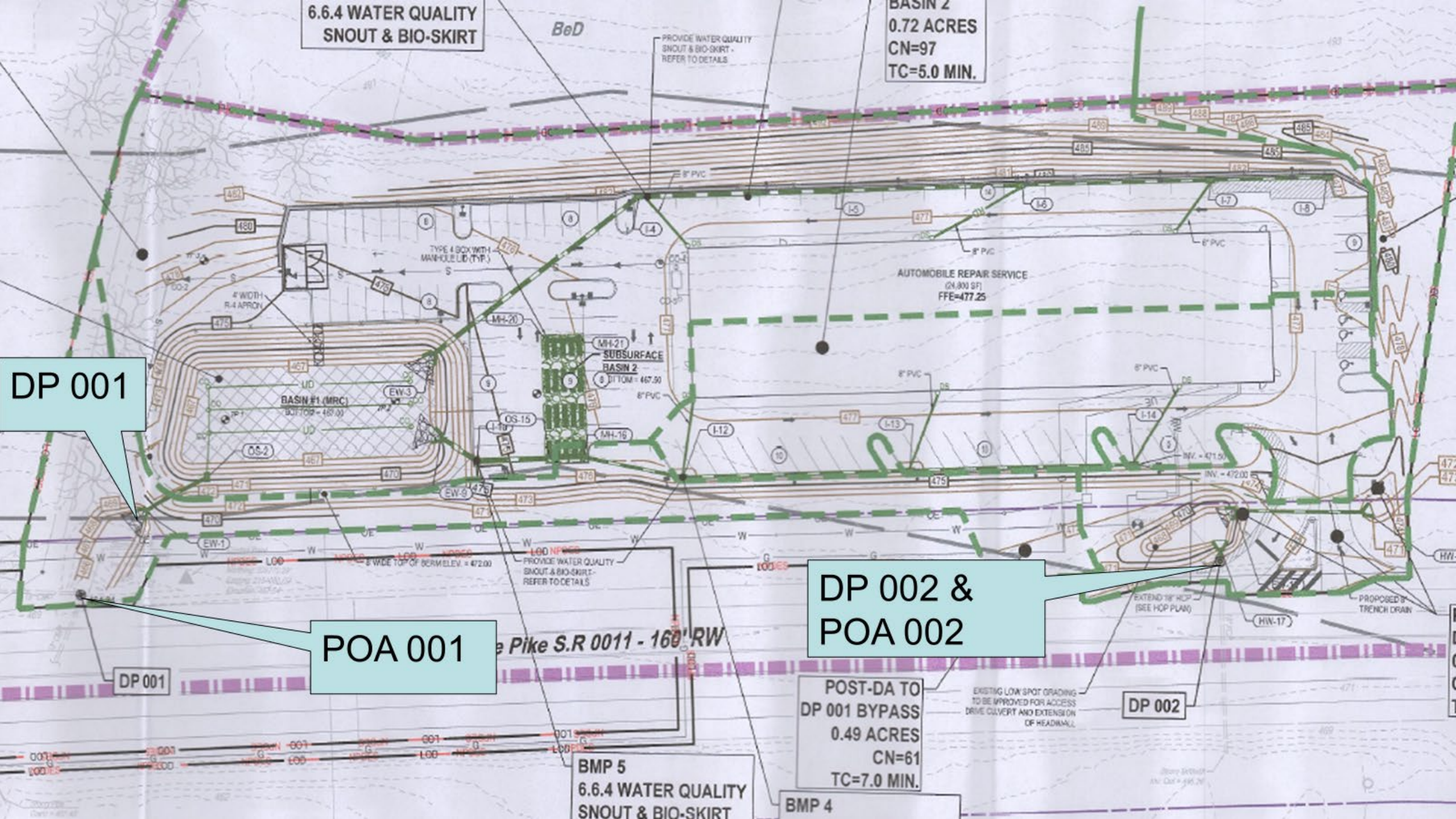
- Level spreader designed to produce sheet flow immediately below the spreader
- Sheet flow depth is < 0.10 foot

Erosion Potential Analysis (EP Analysis)

When is an EP Analysis NOT Required



The flow path characteristics will not change as a result of construction and calculations are provided to demonstrate that the 10-year/24-hour storm discharge rate will not increase.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DP 002 &
POA 002
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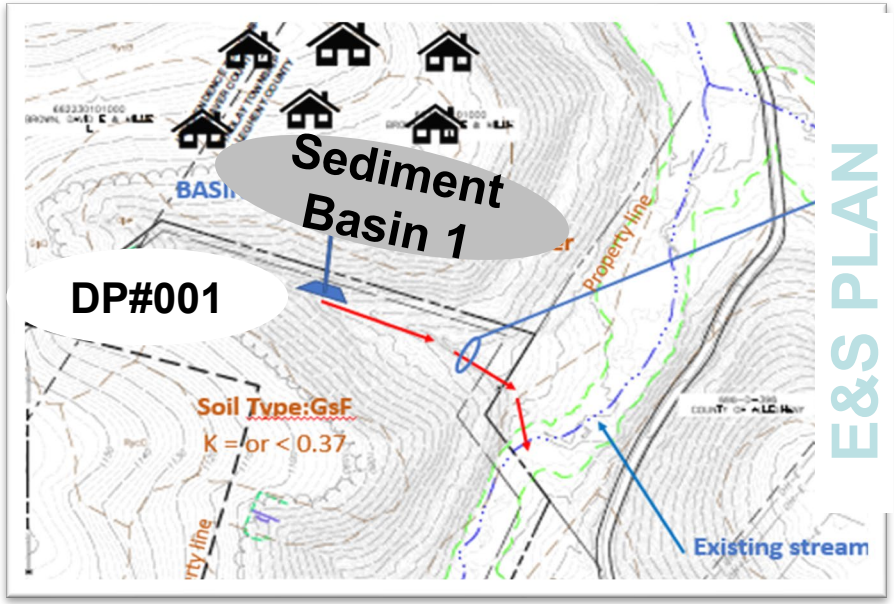
EXISTING LOW SPOT GRADING TO BE IMPROVED FOR ACCESS DRIVE CULVERT AND EXTENSION OF HEADWALL
PROPOSED 8" TRENCH DRAIN
HW-17

Erosion Potential Analysis (EP Analysis)

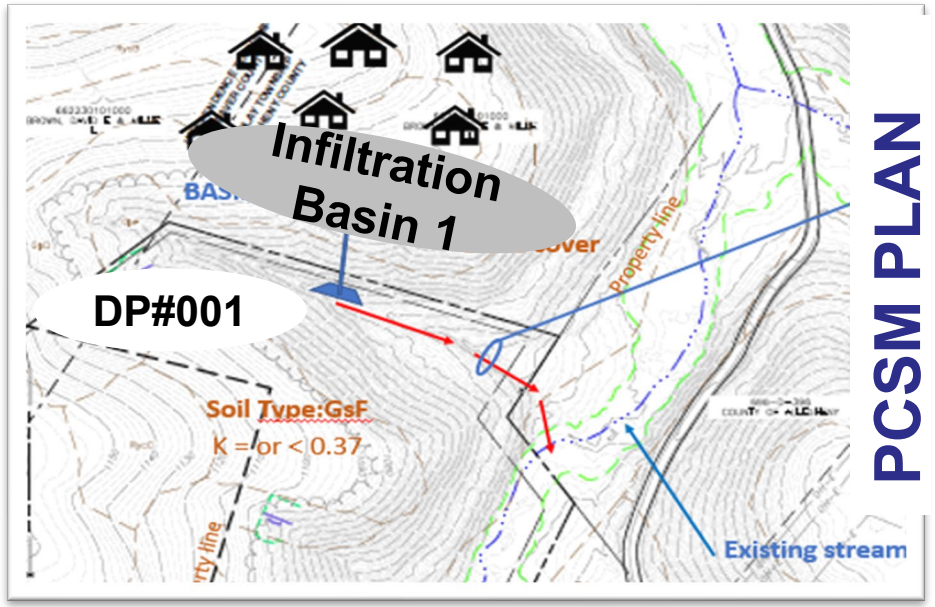
Completing the Form

EROSION POTENTIAL ANALYSIS
FOR CHAPTER 102 PERMITS

DISCHARGE POINT (DP) ID: _____ ☐ **DURING** ☐ **FOLLOWING CONSTRUCTION**



E&S PLAN



PCSM PLAN

Erosion Potential Analysis (EP Analysis)

Conveyance Information

CONVEYANCE INFORMATION

Type of Conveyance:

☐ Existing channel/swale or other flow path that will be partially improved

☐ Existing channel/swale or other flow path that will not be improved

Distance to Property Boundary: _____ ft

Distance to Surface Water or Storm Sewer: _____ ft

Minimum 15 feet is recommended between a level spreader and property boundary

Erosion Potential Analysis (EP Analysis)

Flow Path Information

FLOW PATH INFORMATION

The entire flow path is shown on: ☐ E&S ☐ PCSM Plan Drawings.

Plan Drawing No(s): _____

Description of land cover of flow path: _____

☐ Photographs of the flow path are attached.

Erosion Potential Analysis (EP Analysis)

Critical Section Data

Critical Section Data:

Peak discharge rate at 10-year/24-hour storm *(attach calculations or model output)*: _____ cfs

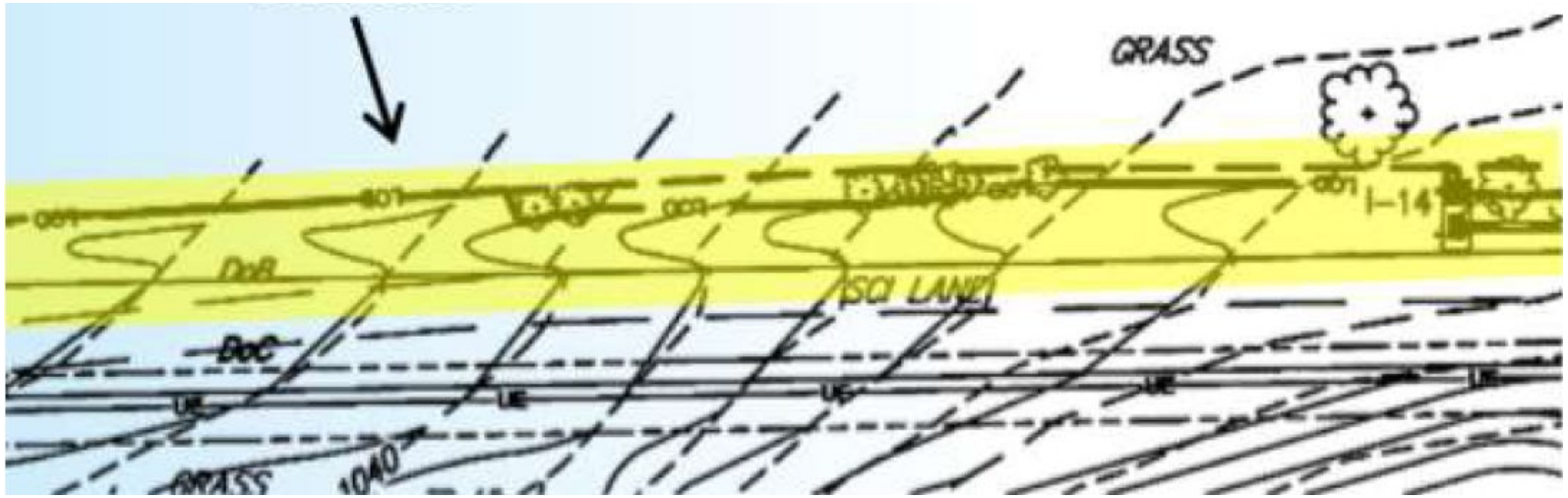
Slope: _____ % Soil type(s): _____ Soil Erodibility (k) factor: _____

Maximum Allowable Velocity: _____ fps Source: _____

Maximum Allowable Shear: _____ psf Source: _____

Calculated Maximum Velocity: _____ fps *(Attach calculations or model output)* **<10% SLOPE**

Calculated Maximum Shear: _____ psf *(Attach calculations or model output)* **ALL**

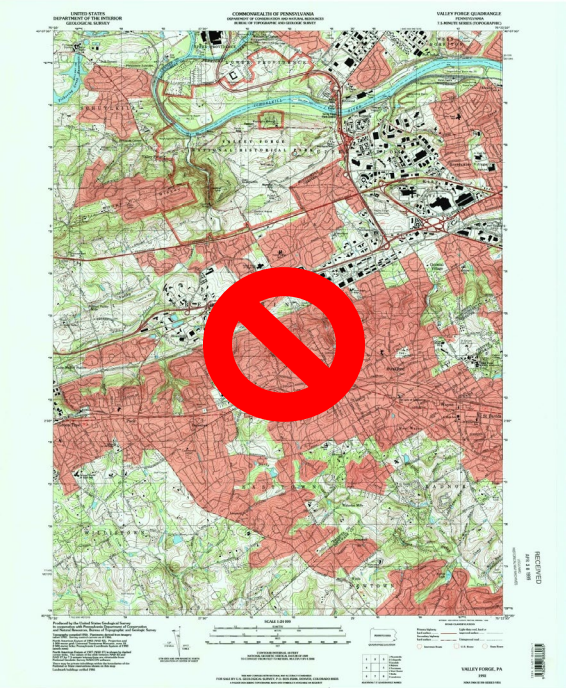


Erosion Potential Analysis (EP Analysis)

Critical Section Data

Source of topographic data for flow path:

☐ The flow path will be improved as described below.



Erosion Potential Analysis (EP Analysis)

Affected Landowners

Affected Landowners: ☐ Stormwater discharges will not flow off-site.

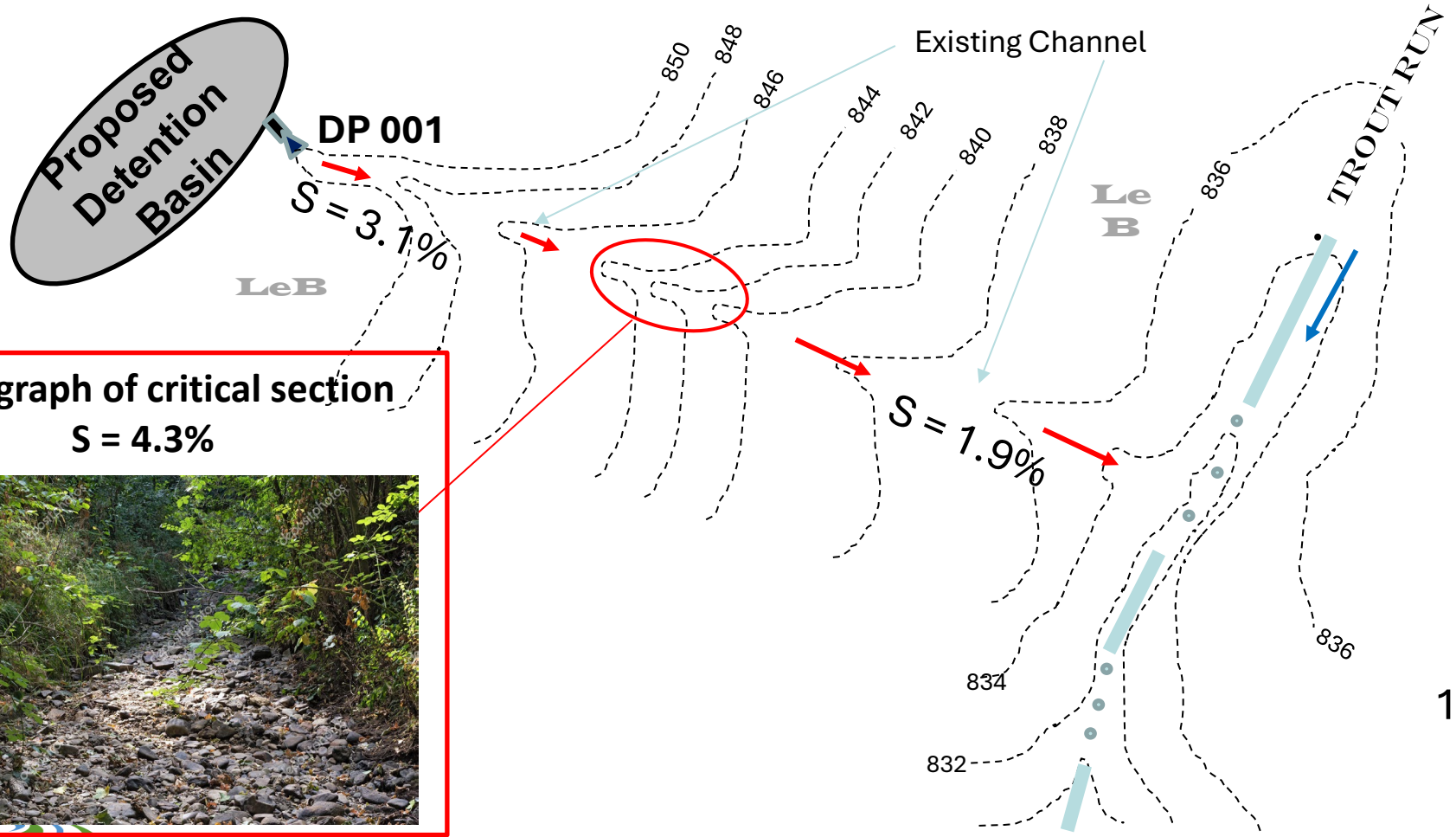
Landowner Name	Address	Phone No.	Email

☐ Landowner consent has been or will be obtained for stormwater discharges.

Landowner consent is not required to obtain permit coverage but is required prior to discharging

Erosion Potential Analysis (EP Analysis)

Example: Basin Discharge



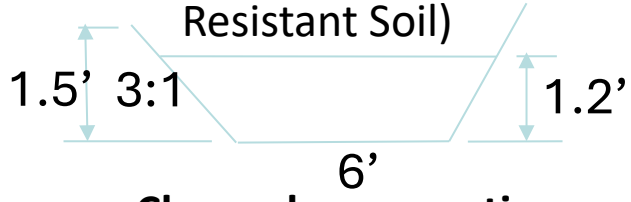
Photograph of critical section
S = 4.3%

Legend

- Flow Path
- Ex. Stream
- Ex. Contour

Soils:

LeB - Leck Kill channery silt loam
K = 0.17 (Erosion Resistant Soil)



Channel cross section

Erosion Potential Analysis (EP Analysis)

Example: Basin Discharge

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: Downstream discharge Analysis
LOCATION: _____
PREPARED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____

CHANNEL OR CHANNEL SECTION		Exist'g				
TEMPORARY OR PERMANENT?	(T OR P)	P				
DESIGN STORM	(2, 5, OR 10 YR)	10 YR				
ACRES	(AC)	18.50				
MULTIPLIER	(1.6, 2.25, or 2.75)[1]	----				
Q_r (REQUIRED CAPACITY)	(CFS)	67.5				
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	118.8				
PROTECTIVE LINING[2]		Natural Stream				
(MANNING'S COEFFICIENT)[2]		0.045	See Table 6.9			
V_a (ALLOWABLE VELOCITY)	(FPS)	6.5	See Table 6.6			
V (CALCULATED AT FLOW DEPTH d)	(FPS)	5.6				
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	-----				
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	-----				
CHANNEL BOTTOM WIDTH	(FT)	6				
CHANNEL SIDE SLOPES	(H:V)	10:1				
D (TOTAL DEPTH)	(FT)	1.5				
CHANNEL TOP WIDTH @ D	(FT)	36				
d (CALCULATED FLOW DEPTH)	(FT)	1.2				
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	30				
BOTTOM WIDTH: FLOW DEPTH RATIO	(12:1 MAX)	5				
d_{50} STONE SIZE	(IN)	3				
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	31.5				
R (HYDRAULIC RADIUS)		.87				
S (BED SLOPE)[3]	(FT/FT)	.043				
S_c (CRITICAL SLOPE)	(FT/FT)					
$.7S_c$	(FT/FT)					
$1.3S_c$	(FT/FT)					
STABLE FLOW?	(Y/N)	-----				
FREEBOARD BASED ON UNSTABLE FLOW	(FT)	-----				
FREEBOARD BASED ON STABLE FLOW	(FT)	-----				
MINIMUM REQUIRED FREEBOARD[4]	(FT)	-----				
DESIGN METHOD FOR PROTECTIVE LINING [5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		V				

TABLE 6.9
Recommended n Values to be Used with Manning's Equation When Doing Stability Analyses of Receiving Streams

Design values should be utilized unless documentation is provided (narrative/calculations) to show that another value within the minimum and maximum range is appropriate.

Surface	Min.	Design	Max.
Asphalt Lining		0.015	
Brick in cement mortar; brick sewers	0.012	0.015	0.017
Concrete-lined channel	0.012	0.015	0.018
Cement-rubble surface	0.017		0.030
Neat cement surfaces	0.010	0.012	0.013
Plastic-lined channel	0.012		0.014
Shotcrete	0.016		0.017
Asbestos Cement Pipe		0.009	
Concrete pipe	0.012	0.015	0.016
Vitrified Clay Pipe	0.010	0.013	0.017
Common-clay drainage tile	0.011	0.012	0.017
Semi-circular metal flumes, smooth	0.011		0.015
Corrugated	0.023	0.025	0.030
Channels and ditches			
Earth, straight and uniform	0.017	0.023	0.025
Rock cuts, smooth and uniform	0.025	0.030	0.035
jagged and irregular	0.035	0.040	
Dredged earth channels	0.025	0.028	0.033
Earth bottom, rubble sides	0.028	0.030	0.035
Natural Streams			
1. Clean, straight bank, full stage no rifts or deep pools	0.025		0.033
2. Same as 1, but some weeds and stones	0.030		0.040
3. Winding, some pools and shoals, clean	0.033		0.045
4. Same as 3, lower stages, more ineffective slope and sections	0.040		0.055
5. Same as 3, same weeds and stones	0.035		0.050
6. Same as 4, stony sections	0.045		0.060
7. Sluggish river reaches, rather weedy or	0.050		0.080

TABLE 6.6
Riprap Gradation, Filter Blanket Requirements, Maximum Velocities

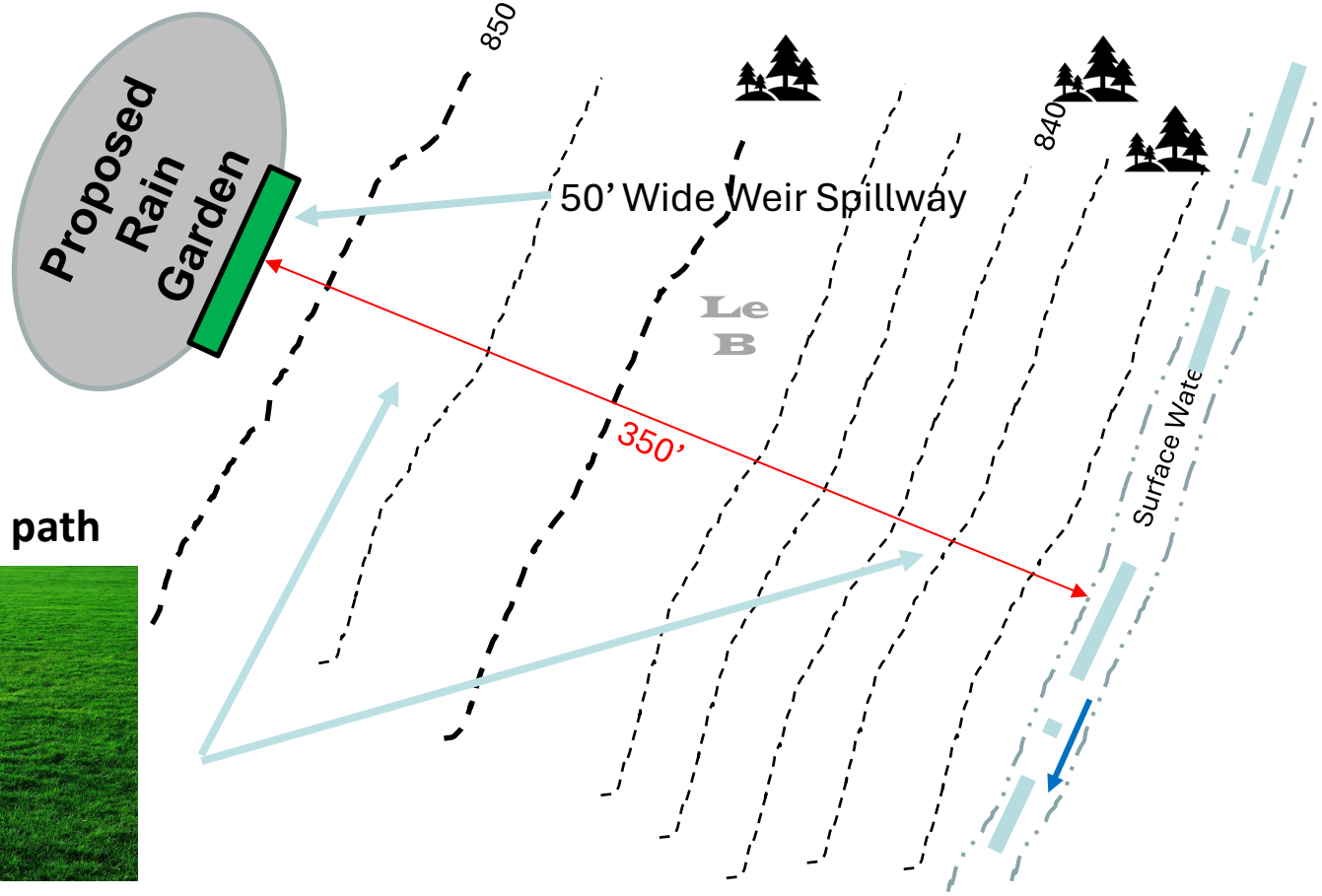
Class, Size NO.	Percent Passing (Square Openings)					
Rock Size (Inches)	R-8	R-7	R-6	R-5	R-4	R-3
42	100					
30		100				
24	1-50		100			
18		15-50		100		
15	0-15					
12		0-15	15-50		100	
9				15-50		
6			0-15		15-50	100
4				0-15		
3					0-15	15-50
2						0-15
Nominal Placement Thickness (inches)	63	45	36	27	18	9
Filter Stone[1]	AASHTO #1	AASHTO #1	AASHTO #1	AASHTO #3	AASHTO #3	AASHTO #57
V_{max} (ft/sec)	17.0	14.5	13.0	11.5	9.0	6.5

Adapted from PennDOT Pub. 408, Section 703.2(c), Table C

1 This is a general standard. Soil conditions at each site should be analyzed to determine actual filter size. A suitable woven or non-woven geotextile underlayment, used according to the manufacturer's recommendations, may be substituted for the filter stone for gradients < 10%.

Erosion Potential Analysis (EP Analysis)

Example of Weir Discharge



Legend

- Flow Path
- Ex. Stream
- Ex. Contour

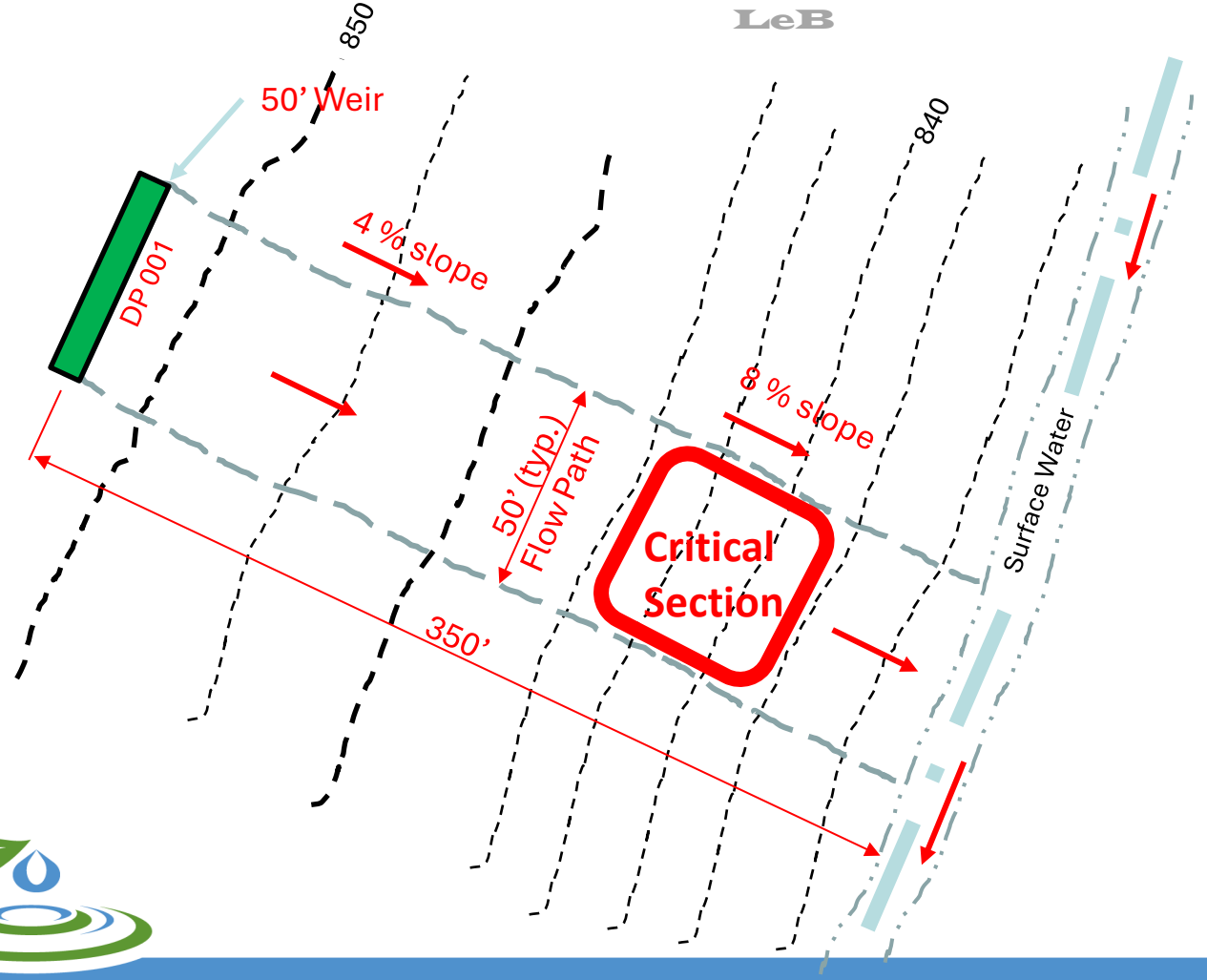
Soils:

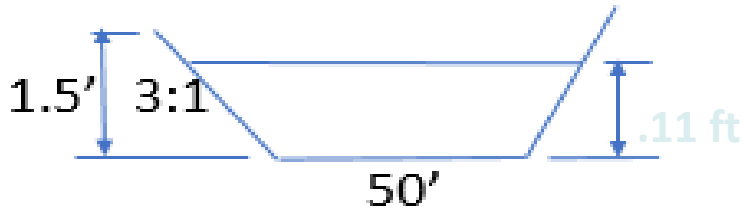
LeB - Leck Kill channery silt loam
K = 0.17 (Erosion Resistant Soil)

Photograph of flow path

Erosion Potential Analysis (EP Analysis)

Example of Weir Discharge





Weir Spillway Cross Section

$H = [Q/CL]^{1/1.5}$

Where Q = flow = 5 cfs

C = weir coefficient = 2.6

L = length of weir = 50 ft.

$= [5/(2.6)(50)]^{1/1.5}$

$= 0.11$ ft.

Erosion Potential Analysis (EP Analysis)

Example of Weir Discharge

FIGURE 5.1
Nomograph to Determine Shallow Concentrated Flow Velocity

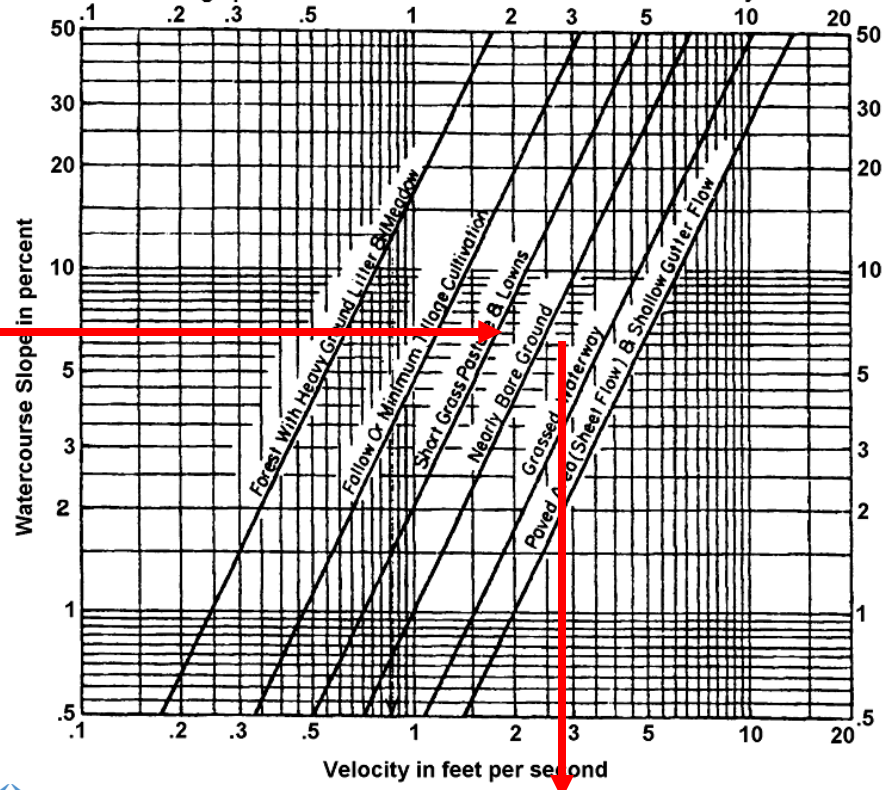


TABLE 6.4
Maximum Permissible Velocities (ft/sec) for Channels Lined with Vegetation

Cover	Slope Range Percent	Erosion Resistant Soil[1]	Easily Eroded Soil [2]
Bermuda Grass	0 - 5%	6.0 [3]	5.0
Kentucky Bluegrass		5.5 [3]	4.5
Tall Fescue (endophyte-free)		5.5 [3]	4.5
Grass Legume Mixture		4.5	3.5
Bermuda Grass	5-10 %	5.5 [3]	4.5
Kentucky Bluegrass		5.0	4.0
Tall Fescue (endophyte-free)		5.0	4.0
Grass Legume Mixture		3.5	3.0

Modified from USDA-NRCS
[1] Cohesive (clayey) fine grain soils and coarse grain soils with a plasticity index OF 10 TO 40 (CL, CH, SC and GC). **SOILS WITH K VALUES EQUAL TO OR LESS THAN 0.37**.
[2] **SOILS WITH K VALUES GREATER THAN 0.37**.
[3] Use velocities exceeding 5 ft/sec only where good cover and proper maintenance can be obtained.

NOTE: These values subject to the 7 limitations below

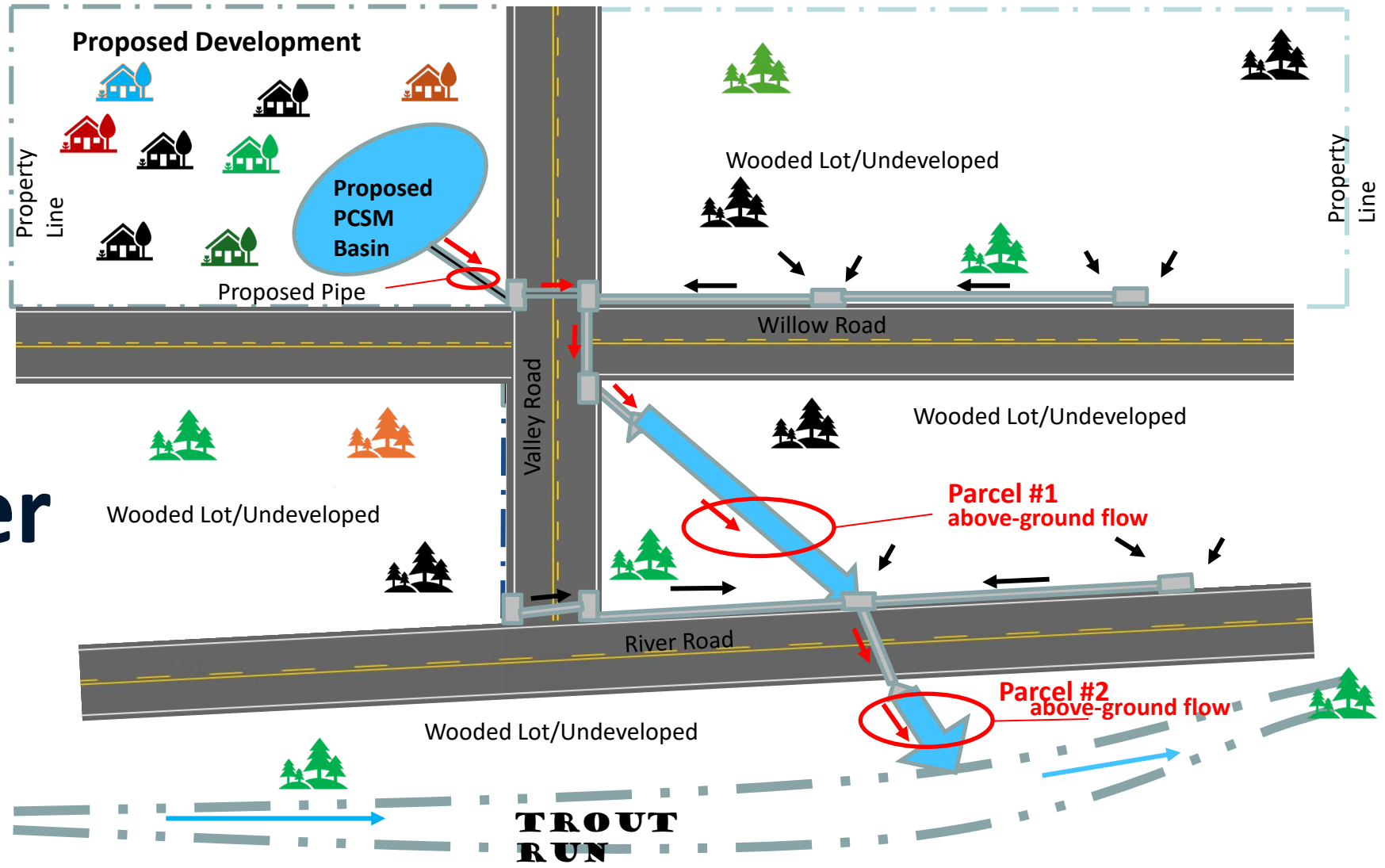
ADDITIONAL NOTES REGARDING THE USE OF TABLE 6.4

1. A velocity of 3.0 ft/sec should be the maximum if because of shade, soils or climate, only a sparse cover can be established or maintained.
2. **A velocity of 3.0 to 4.0 ft/sec should be used under normal conditions if the vegetation is to be established by seeding**.
3. A velocity of 4.0 to 5.0 ft/sec should be used only in areas if a dense, vigorous sod is obtained quickly or if water can be diverted out of the waterway while vegetation is being established.
4. A velocity of 5.0 to 6.0 ft/sec may be used on well established, good quality sod. Special maintenance may be required.
5. A velocity of 6.0 to 7.0 ft/sec may be used only on established, excellent quality sod, and only under special circumstances in which flow cannot be handled at a lower velocity. Under these conditions, special maintenance and appurtenant structures will be required.
6. If stone centers, or other erosion resistant materials supplement the vegetative lining, the velocities in the above table may be increased by 2.0 ft/sec.
7. When base flow exists, a rock lined low flow channel should be designed and incorporated into the vegetative lined channel section.

2.0 ft./sec < 5.0 ft./sec.

Erosion Potential Analysis (EP Analysis)

Example of Storm Sewer to Non-Surface Water



Module 2 Wetlands

3800-PM-BCW406b Rev. 10/2024
PCSM Module 2

STORMWATER ANALYSIS – WATER QUALITY					
☐ A printout of DEP's PCSM Spreadsheet – Quality Worksheet is attached for all surface waters receiving discharges.					
OTHER INFORMATION					
1. ☐ A long-term operation and maintenance (O&M) plan has been prepared for each SCM.					
2. ☐ A long-term O&M plan will be recorded with a legal instrument for each property containing an SCM.					
3. ☐ PCSM Plan Drawings have been developed for the project and are attached to the NOI/application.					
4. ☐ The PCSM Plan has been planned, designed, and will be implemented to be consistent with the E&S Plan.					
5. ☐ Recycling and proper disposal of materials associated with PCSM SCMs are addressed as part of long-term operation and maintenance of the PCSM SCMs.					
6. ☐ There are pre-construction stormwater discharges to wetlands from the project site.					
	Pre-Construction		**Post-Construction**		
Wetland ID	**Drainage Area (ac)**	**Volume (CF)**	**Drainage Area (ac)**	**Volume (CF)**	**Ponding Depth Increase or Decrease (±%)**

Module 2 Wetlands

6. **Wetlands**. Check the box if there are stormwater discharges from the project site to wetlands on the site. If checked, and there are multiple wetlands on the site, report a unique identifier for each wetland on the module and on PCSM Plan Drawings. Report the drainage areas (acres) to the wetlands for the pre- and post-construction conditions and the volume of runoff (CF) draining to the wetlands for the pre- and post-construction conditions up to the 2-year/24-hour storm event. If there will be a projected increase or decrease in volume draining to the wetlands up to the 2-year/24-hour storm event following construction, report the maximum anticipated short-term ponding depth increase or decrease, in positive or negative percentage (±%), determined through hydraulic modeling or calculations (attach model results or calculations to this module).

   NOTE 6 – If a reduction of flow is anticipated to a wetland following construction, DEP/CCD may request that an assessment be performed to determine if there will be an adverse impact to the wetland.

Erosion Potential Analysis (EP Analysis)

Questions?