

# Downstream Analysis



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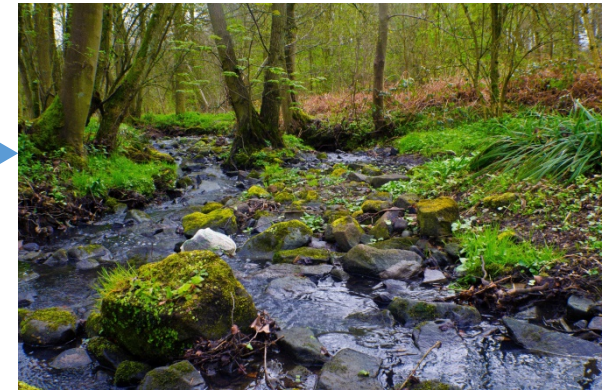
- **What Is It?**
- **When is it needed?**
- **What are the components?**
- **Easements?**



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# What is It?

- An analysis that provides a demonstration that the downstream receiving area has capacity and stability to convey the calculated flow from the proposed discharge from the site to a **surface water**. Identifies the names and addresses of all property owners directly receiving stormwater from the project that is not discharged to a surface water, evaluates stormwater flows (frequency and amount) onto these properties and the nature and scope of all changes to the natural drainage characteristics for all stormwater discharges during and after construction, also evaluates the volume, rate, means and frequency of pre, during, and post construction flows.



*Surface waters*—Perennial and intermittent streams, rivers, lakes, reservoirs, ponds, wetlands, springs, natural seeps, and estuaries, excluding water at facilities approved for wastewater treatment such as wastewater treatment impoundments, cooling water ponds, and constructed wetlands used as part of a wastewater treatment process.



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# When is it needed?

Whenever there is a discharge to a non-surface water or storm sewer.

2. List all stormwater discharge points **after construction and stabilization are complete** and provide the information requested below.  Not Applicable

Discharge Point No.	LATITUDE	LONGITUDE	RECEIVING WATERS					
	Degrees	Degrees	Name of Receiving Waters	Ches. Bay?	Non-Surface Waters	Ch. 93 Class.	Impaired?	TMDL?
				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
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				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

3. Will any of the points identified above discharge to a storm sewer system?  Yes  No      Is the storm sewer an MS4 or CSS?  Yes  No  
 Name of storm sewer owner/operator: \_\_\_\_\_ Discharge points discharging to storm sewer: \_\_\_\_\_

4. Identify and describe all non-stormwater discharges that are expected to occur during permit coverage. Describe the frequency and volume of all such discharges.

No non-stormwater discharges are anticipated.

5. Will there be any new or increased discharge to non-surface waters prior to reaching surface waters?  Yes  No  
*If Yes, the applicant is expected to 1) secure legal authority for the non-surface water discharge if the discharge will be to property not owned by the applicant, and 2) provide for adequate controls during and after earth disturbance activities to prevent accelerated erosion.*



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- **Non-Surface Waters** – Check the box if the applicant is proposing any stormwater discharge to areas other than surface waters, either on or off the project site, during or following construction. For example, an applicant should check this box if a stormwater discharge point will be located at a property boundary to a swale that eventually reaches surface waters.

**NOTE 22** – If there will be off-site discharges (e.g., discharges to a non-surface water such as a swale, ditch, or ground surface via level spreader, that will flow through a property or properties not owned by the applicant prior to reaching a surface water), the applicant is expected to secure an easement (e.g., common law or express easement) providing legal authority for the off-site discharge, unless waived by the property owner, and to provide for adequate BMPs to prevent accelerated erosion on off-site property. Stormwater management to prevent accelerated erosion is also required for discharges to non-surface waters on property owned by the applicant. Submission of an easement for off-site discharges is not required as part of the application package. An Individual NPDES Permit does not grant property rights.

5. **Discharges to Non-Surface Waters.** Check the box for Yes if the applicant is proposing any new or increased stormwater discharge to areas other than surface waters or storm sewers, either on or off the project site, during or following construction; otherwise select No.

**NOTE 25** – If the answer is Yes, then an off-site discharge analysis must be completed and submitted with the application. Refer to DEP's [Frequently Asked Questions \(FAQ\) for Chapter 102 Off-Site Discharges of Stormwater to Non-Surface Waters](#) for additional guidance on what is required with an off-site discharge analysis.



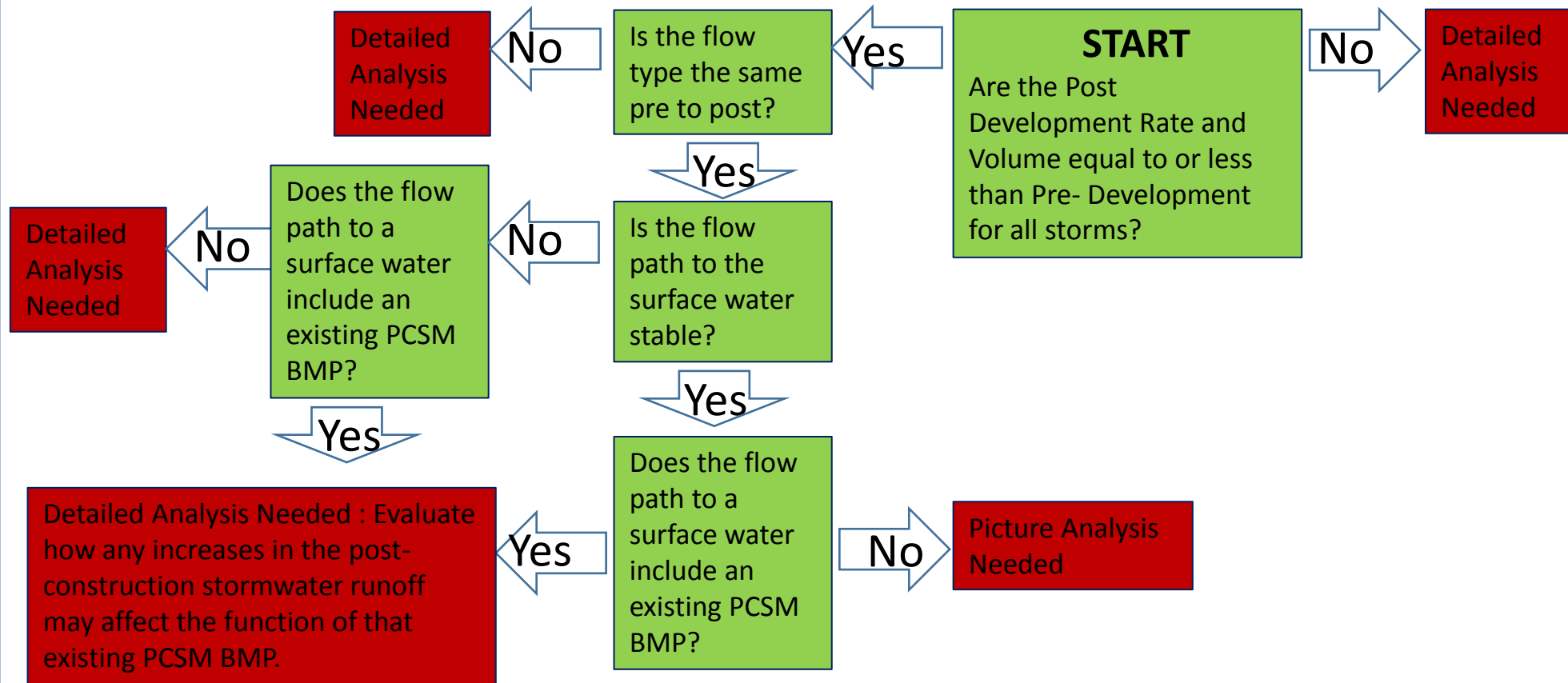
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# 2 Approaches Based on Discharge

- Discharge flow and volume maintained or reduced  
(Picture Analysis)
- Discharge flow or volume increase or flow type changed.  
(Detailed Analysis)



# Downstream Analysis Flowchart



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# Components

- On the Erosion and Sediment Control (E&S) and the PCSM Plan drawings, identify all properties and property owners that will or may receive off-site stormwater discharges from the project site until discharges reach surface waters. (GIS is your friend)
- On the E&S and PCSM Plan drawings, identify the flow path from discharge point to the confluence with a surface water. In addition, identify the soil types, erodibility factors and vegetative cover of the flow path. (Lidar from PASDA and aerials are your friend)
- In the written narrative portion of the E&S and PCSM Plans, provide an analysis that demonstrates that the proposed volume and peak rate of stormwater discharging to the flow Off-Site Discharges path will avoid, minimize, or mitigate accelerated erosion or sedimentation.
- Where the flow discharges to a MS4 or CSO storm sewer a signoff from the owner will be needed.
- NOTE – If there is an increase in stormwater runoff volume or rate, DEP may require a scour analysis to be performed upon the receiving surface water.



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# What is needed - Detailed Analysis

- Flows / volume increasing or no channel-provide stability analysis
  - Analyze at most vulnerable spot
  - Ability to withstand velocities.
  - Provide calculations
  - Upgrade or provide channel to stable conveyance
- Existing Channel is unstable or eroding:
  - Show existing condition (bare earth) can withstand flows or
  - Upgrade to handle post development flows



# Components- Detailed Analysis

- **Determining Flows:** (*E&S Manual, Page 161, Item 14*)
  - Temporary Sediment Basins:
    - 2 cfs/acre discharge
  - Sediment Basins to be converted to Permanent Basins:
    - Greater of 2 cfs/acre or 100 year outflow
  - Permanent Basins:
    - 100 year outflow
  - Other Discharges (Storm Pipes and Offsite Discharges)
    - 10 year storm minimum or required pipe sizing storm (25 yr)



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# Components – Picture Analysis

- Pictures of the flow path from the discharge point to the surface water tied to a plan. Capture all changes in conveyance (slope, swale, pipes, cover types, etc.)
- Narrative description of flow path stability and comparison of pre vs post rate and volume runoff from the site.



# Components– Discharge flows through an existing BMP

- When an applicant's post-construction stormwater runoff will or may pass through an existing PCSM BMP or other stormwater management facility, the applicant must evaluate how any increases in their post-construction stormwater runoff may affect the function of that existing PCSM BMP or other stormwater management facility.



# Easements

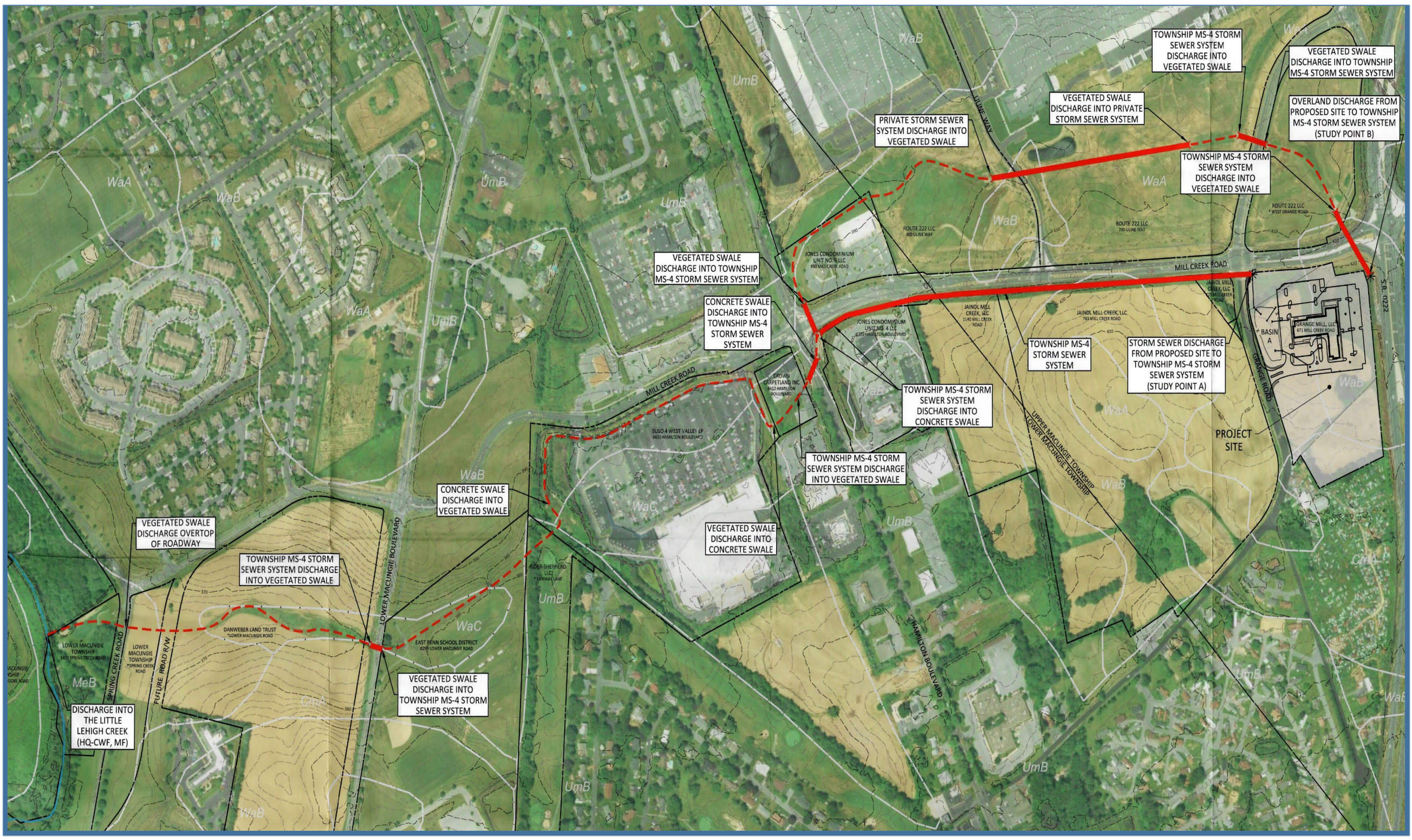
- What is a permittee legally responsible for with respect to off-site discharges?
  - **Common Law** For sites that discharge to existing swales, ditches, storm sewers or similar structures where the new activities will not result in a change in volume or rate of stormwater runoff (for all storm events).
  - **Express Easement** will likely be necessary when there will be a change in volume or rate of stormwater (for all storm events). If an express easement is necessary, the easement should be in place before any new or increased stormwater discharges commence.



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# Example Plan





TOWNSHIP MS-4 STORM SEWER SYSTEM DISCHARGE INTO VEGETATED SWALE

VEGETATED SWALE DISCHARGE INTO TOWNSHIP MS-4 STORM SEWER SYSTEM

VEGETATED SWALE DISCHARGE INTO PRIVATE STORM SEWER SYSTEM

OVERLAND DISCHARGE FROM PROPOSED SITE TO TOWNSHIP MS-4 STORM SEWER SYSTEM (STUDY POINT B)

TOWNSHIP MS-4 STORM SEWER SYSTEM DISCHARGE INTO VEGETATED SWALE

PRIVATE STORM SEWER SYSTEM DISCHARGE INTO VEGETATED SWALE

VEGETATED SWALE DISCHARGE INTO TOWNSHIP MS-4 STORM SEWER SYSTEM

CONCRETE SWALE DISCHARGE INTO TOWNSHIP MS-4 STORM SEWER SYSTEM

TOWNSHIP MS-4 STORM SEWER SYSTEM

STORM SEWER DISCHARGE FROM PROPOSED SITE TO TOWNSHIP MS-4 STORM SEWER SYSTEM (STUDY POINT A)

TOWNSHIP MS-4 STORM SEWER SYSTEM DISCHARGE INTO CONCRETE SWALE

TOWNSHIP MS-4 STORM SEWER SYSTEM DISCHARGE INTO VEGETATED SWALE

CONCRETE SWALE DISCHARGE INTO VEGETATED SWALE

VEGETATED SWALE DISCHARGE INTO CONCRETE SWALE

VEGETATED SWALE DISCHARGE OVERTOP OF ROADWAY

TOWNSHIP MS-4 STORM SEWER SYSTEM DISCHARGE INTO VEGETATED SWALE

VEGETATED SWALE DISCHARGE INTO TOWNSHIP MS-4 STORM SEWER SYSTEM

DISCHARGE INTO THE LITTLE LEHIGH CREEK (HQ-CWF, MF)

# Questions?



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