pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

EROSION POTENTIAL ANALYSIS FOR CHAPTER 102 PERMITS INSTRUCTIONS

General

An Erosion Potential (EP) Analysis is generally needed as part of Chapter 102 permit applications and Notices of Intent (NOIs) to evaluate the potential for accelerated erosion during and after construction for the following types of stormwater discharges:

- Concentrated flows, such as outflows from erosion and sediment control (E&S) best management practices (BMPs) or post-construction stormwater management (PCSM) stormwater control measures (SCMs), that will be directed to areas on-site and/or off-site that are not surface waters (e.g., swales, ditches, channels, open areas such as fields) or storm sewers that are tributary to surface waters. A discharge point (DP) should be identified on E&S Plans and/or PCSM Plans at the outflow of the BMP or SCM to denote a location where an EP Analysis has been performed. Note that the stormwater analysis required by 25 Pa. Code § 102.8(g) may or may not be necessary at this DP.

- Sheet flows from a level spreader (or equivalent) or from a new undetained impervious area (i.e., an area of new impervious surface that does not drain to a SCM) where either:

    - The distance between the level spreader or impervious area and surface waters or storm sewers that directly discharge to surface waters exceeds 100 feet; or

    - The average slope of the flow path exceeds 2:1.

    If sheet flow will travel more than 100 feet to surface waters or storm sewers, the DP should be located at 100 feet from the impervious area or level spreader. If sheet flow will enter a downslope area with slope exceeding 2:1, the DP should be located at the beginning of the flow path that is steeper than 2:1 slope. The EP Analysis should evaluate the flow path from the DP to the surface water or storm sewer that directly discharges to surface waters.

Except as otherwise required by the Department of Environmental Protection (DEP) or a delegated county conservation district (CCD), an EP Analysis is generally unnecessary where 1) the flow path of sheet flow from new impervious areas is less than or equal to 100 feet; 2) sheet flow originates from pervious areas*****; and 3) the permit application or NOI instructions do not require an EP Analysis. In addition, an EP Analysis is not necessary when a new channel will be designed and constructed to convey stormwater runoff in accordance with DEP's Erosion and Sediment Pollution Control Program Manual (363-2134-008; 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.

*** NOTE 1** – In situations were significant changes to existing grades are proposed, vegetative ground cover is considered poor, and/or there are highly erodible soils, the Erosion and Sediment Control (E&S) or Post-Construction Stormwater Management (PCSM) Plan preparer should consider completing an EP Analysis even for pervious areas where the flow path will not exceed 100 feet.

NOTE 2 – Where stormwater will flow into a storm sewer system, regardless of whether an EP Analysis is necessary for the flow path to the storm sewer, the E&S and/or PCSM Plans must show the path of the sewer from the project site to its outlet at a surface water.

Figure 1 below provides an example illustration and photograph of a situation where an EP Analysis would be necessary. A PCSM detention basin SCM discharges to a riprap apron, and stormwater flow enters a small ditch in a field that travels approximately 500 feet prior to discharging into an intermittent surface water.

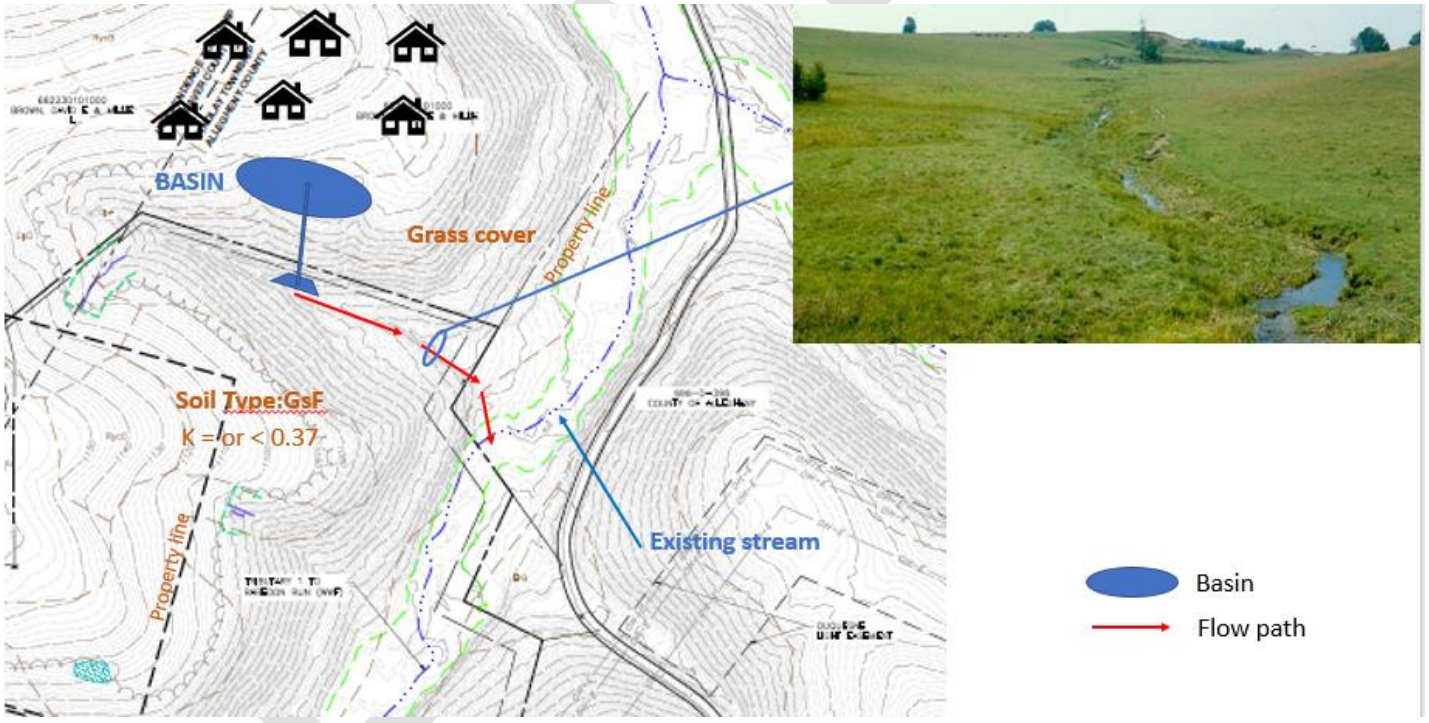
The need for an EP Analysis does not depend on whether the flow path includes properties that are not part of the project site. A stable flow path to a surface water or storm sewer is necessary regardless of the property through which it flows. However, if the flow path includes off-site properties, it is incumbent on the applicant to investigate the downstream conditions to assure there are adequate rights, either existing or obtained, to discharge flows from a project site. Existing common law drainage easement rights, if they exist, generally allow only the discharge of flows that do not

materially change in rate, duration, quantity, or quality from the conditions that existed before development. The E&S or PCSM Plan preparer should be aware that flows often do change materially after development. The change in the rate, duration, quantity, and quality are often most noticeable at the outlet of a BMP where it is likely that more stormwater from a site is concentrated and is generally discharged for a longer period of time than occurred pre-development. Pennsylvania courts have established that there are limits to the increase in volume, rate and duration of flows allowed by a common law easement. It is the responsibility of the owner of the project site to obtain the legal right to discharge stormwater or defend any common law rights relied upon in the PCSM design.

An EP Analysis should be completed for each DP. At the top of the form enter the DP ID number (e.g., 001) as identified on the E&S or PCSM Plan Drawings and NOI/application. Check the appropriate box at the top of the form to indicate whether the EP Analysis has been completed for stormwater discharges occurring during or following construction.

During construction, DPs do not need to be identified for areas of sheet or shallow concentrated flow that are controlled by perimeter BMPs. During construction, DPs would typically be identified at the outlets of sediment traps and basins. If the trap or basin will be converted to a PCSM SCM, an EP Analysis is not needed twice for the same DP. The E&S or PCSM Plan preparer(s) should determine whether the maximum flow condition (up to the 10-year/24-hour storm) will occur during or following construction and complete the EP Analysis for that maximum flow condition. It should not be assumed that the maximum flow condition will always occur following construction; where an E&S BMP will be converted to a PCSM SCM, the person completing the EP Analysis should attach calculations to the EP Analysis form to demonstrate which condition will experience higher stormwater flows.

Figure 1: Example Illustration and Photograph of a Condition Requiring an EP Analysis



At the top of the form enter the Applicant's Name and the Project Site Name.

Discharge Information

Type of Discharge. Check the appropriate box to indicate whether the stormwater discharge is concentrated flow from the outlet of a BMP or SCM; sheet flow where flow path > 100 feet.; or sheet flow where slope > 2:1.

Type of Conveyance. Check the appropriate box to indicate whether stormwater discharges will be conveyed through an existing channel or swale that will be partially improved to address potential erosion; an existing channel or swale that will not be improved; or by overland (sheet) flow without improvements.

Distances. Report the distances, in feet (ft), from the source of the discharge (e.g., BMP outlet, level spreader, impervious surface) and 1) the property boundary and 2) the closest surface water or (private or public) storm sewer that is tributary to surface waters.

Flow Path Information

Plan Drawings. Check the appropriate box to indicate whether the entire flow path is shown on E&S or PCSM Plan Drawings (or both). Also report the Plan Drawing (or Sheet) numbers that show the flow path to assist the reviewer.

Description. Provide a description of the land cover of the flow path. If the flow path is a non-vegetated channel, describe the width, depth, and composition of the channel.

Photographs. Attach one or more photographs of the flow path. Identify on the Plan Drawing(s) where the photograph(s) were taken.

Critical Section Data

The E&S or PCSM Plan preparer should evaluate the entire flow path to identify the "critical section" where the potential for erosion is the greatest. This may be at a location with the steepest slope or another condition such as highly erodible soils. Multiple sections of the flow path should normally be analyzed to determine the critical section. The critical section should be identified on E&S and/or PCSM Plan Drawings. Complete the following information for the critical section:

Peak discharge rate at 10-year/24-hour storm. Through calculations or modeling, determine the peak rate, in cubic feet per second (cfs), at the critical section.

Slope. Report the upgradient slope at the critical section, as measured from the start of the flow path (or another point where there is a clear break in slope) to the critical section. Report in units of percent (%). For example, if there is a five-foot drop over a 50-foot horizontal run up to the critical section, report 10% ((5 ft / 50 ft) x 100).

Soil Type(s). List the soil map unit(s) for the soils at the critical section. The NRCS web soil survey may be used for this purpose.

Soil Erodibility (k) factor: This factor is a measure of the susceptibility of soil particles to detachment and transport by rainfall and runoff, and values range from 0.02 to 0.69. The NRCS web soil survey may be used for this purpose.

Maximum Allowable Velocity and Shear. Using information contained in Chapter 6 of the E&S Manual or other published sources, report the maximum allowable velocity, in feet per second (fps), or maximum allowable shear stress, in pounds per square foot (psf), for the critical section of the flow path. Only one of these two parameters are necessary. Identify the source of the reported velocity or shear (e.g., Tables 6.2 or 6.4 of E&S Manual).

Calculated Maximum Velocity and Shear. Calculate the maximum velocity or shear stress (corresponding to the parameter selected above) that the critical section is expected to receive during the 10-year/24-hour storm event. Attach calculations or model output to the EP Analysis form.

Topographic Data. List of the source of the topographic data used in the EP Analysis for the flow path. Light Detection and Ranging (LIDAR) or other site-specific survey data should be used. Use of USGS 7.5-minute quadrangle maps with 20-foot contours is not acceptable.

Flow Path Improvement. If the flow path will be improved (e.g., vegetated or revegetated, addition of stone/riprap), check the appropriate box and describe the improvements that are planned.

Affected Landowners

If stormwater discharges from the site will not flow off-site, check the appropriate box. Otherwise record the name(s), address(es), phone number(s), and email address(es) of all landowners downgradient of the project site that will receive flows from the site. On the E&S and/or PCSM Plan Drawings, identify property boundaries and off-site property owners. Check the appropriate box if the applicant has or will obtain consent from these landowners for stormwater discharges from the site. DEP/CCD may request to see the consent when conducting a site inspection.

Enter the name of the individual completing the EP Analysis form and the date the form was completed.

Attach the EP Analysis form (including photographs and calculations or model outputs) to the Chapter 102 NOI or permit application.