

Stormwater Facility Inspection Guidance Document For Facility Owners

This is a supplement to the Stormwater Facility Inspection Form developed by Hanover County. This document defines and clarifies the intent of each section on the Inspection Form. Many of the items being inspected appear multiple times on the form but under different headings. To simplify we have included a definitions section for repeated items at the end of this document.

General Information

Facility Information:

“Plan Name” should be the project name from the plans on which the facility was originally approved.

“GPIN #” should be the GPIN or GPINs of the parcel(s) on which the facility is currently located. This is a 10 digit number unique for each property, and is available online from the county’s GIS site at: <http://www.hanovercountygis.org/cdnr/> and is also shown on tax bills.

“Associated Plan #” should be the project number from the approved plans, usually in the lower right hand section of the title sheet. For commercial projects it is likely a SPR #, for Subdivisions the name, or applicable Erosion and Sediment # (E&S).

“Plan AP Date” should be the date from the County Approval Stamp signed on the title sheet of the plans. Typically the Planning Department issues final plan approval.

“Basin Type” is the type of facility, e.g. Extended Detention, Bioretention Basin, etc., and should be taken from the original approved plans when available. If this information is not on the approved plans it should be determined using professional judgment.

“Latitude (N)” is the GPS latitude reading of the top of the dam at or above the principal spillway.

“Longitude (W)” is the GPS longitude reading at the top of the dam at or above the principal spillway.

“HUC Code” is the Virginia’s 6th Order Hydraulic Unit Code that the facility is located in, e.g. YO27, which represents the watershed area. The HUC codes are available from maps maintained by the Department of Public Works or on Hanover County’s website at the following link: http://www.co.hanover.va.us/works/envirmnt_ImpairedStrmsImpactMap.pdf

Owner’s Information:

“Name and Address” Please provide the name and address information of the Owner of the facility or the entity responsible for maintenance of the facility.

“Phone” Please provide the phone number for the Owner of the facility or the entity responsible for maintenance of the facility.

“Fax” Please provide the fax number for the Owner of the facility or the entity responsible for maintenance of the facility.

Facility Conditions

This part of the form is designed so that individual components of the stormwater facility are inspected for specific issues. Each numbered heading is a different component of the facility. The lettered items list the issues specific to that component of the facility to inspect for. Facilities will not have all components listed. If a facility does not have a component listed, enter N/A in the remarks section of the Inspection Form for that component.

- 1. General Dam Condition:** The general conditions section examines the dam as a whole. “Any Alterations to the dam” refers to any changes in the dam surface, such as grading, the addition of structures, sidewalks, flag poles and the like. Anything different or added since the last inspection should be noted here and needs to be removed if it interferes with the operation of the facility or creates additional hazards. Items B through D are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).
- 2. Upstream Impoundment Slope:** This section focuses on the face of the dam, which is the side that interacts with the water level. Items A through D are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).
- 3. Downstream Impoundment Slope:** This section focuses on the back of the dam, from the top to the bottom where the embankment meets the natural grades (called the “toe” of the slope) and slightly beyond. “Drains or wells flowing” typically refers to small plastic pipes that will direct water from problem areas to a viable outlet, such as an end wall or riprap section. They are usually present under concrete structures like large spillways and pipes that have stone bedding. Rather than letting the drainage travel through the stone below the structure and potentially erode it, it is directed into a drain and piped to a controlled location. Flow from these pipes is a good indicator of the saturation level in the dam and basin. “Seepage or boils” are springs that pop up out of the soil and actively flow and churn away embankment material. Other items are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).
- 4. Abutment Contact:** The abutment contacts are where the ends (left and right) of the earthen dam structure meet the natural ground. Check this area for visible signs of slides where larger amounts of material slough off or move down a slope, usually due to differences in soil conditions or materials. Other items are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).
- 5. Control Structure:** The control structure is the outlet structure that normally controls the flow of stormwater through the facility. It can take many forms. Two of the most typical types of control structures are a metal or concrete riser with a barrel pipe through the dam, or a concrete weir structure that the water flows over. Check the appropriate material type for the outlet control structure and note the type and size of the control structure in the remarks area. “Trash rack damaged (or inadequate)” refers to the structure that prevents debris and trash from entering the control structure and blocking flow. Cleaning trash racks should be a part of frequent and routine maintenance to ensure the facility functions properly. “Obstacles to inlet” are anything that would slow or block the flow of water entering the control structure, such as excessive vegetation, debris, or trash. “Drawdown inoperative” refers to a mechanism that controls which outlet is operational, and is only present on some facilities. If present, check to see that the drawdown mechanism is functional. If it is rarely used it can become immobile.

Other items are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).

- 6. Outlet Structure (Principal Spillway or Barrel Pipe):** The outlet structure is the part of the facility that conveys drainage from the control structure to an outlet beyond the back of dam. Check the appropriate material type for the outlet structure and note the type and size of the outlet structure in the remarks area. For “Outlet Misaligned” check to see that the outlet structure properly functions and is not leaking because the sections don’t line up properly. Other items are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).
- 7. Emergency Spillway (Earthen):** An emergency spillway is a channel that conveys stormwater during large storm events from the basin to an outlet located at the toe of the embankment. It prevents the dam from overtopping during the design storm event. Not all facilities have an emergency spillway. Earthen spillways include channels that are not concrete lined which can be lined with grass, rip-rap or erosion control fabric. If the facility’s emergency spillway is earthen, this section of the inspection form should be utilized, if not please mark “NA” and proceed to #8 on the form. Identify the lining type for the spillway as discussed above. Items A through D are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).
- 8. Emergency Spillway (Concrete):** An emergency spillway is a channel that conveys stormwater from large storm events from the basin to an outlet located at the toe of the embankment. It prevents the dam from overtopping during the design storm event. Not all facilities have an emergency spillway. If the facility’s emergency spillway is concrete lined this section of the inspection form should be utilized, if not please mark “NA” and proceed down the form. Items A through D are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).
- 9. Outlet Channel & Protection:** The outlet channel is the receiving channel for the discharge from the stormwater facility. Outlet protection is a non-erodible rough surfaced material, usually riprap, designed to control erosion in the outlet channel by slowing the outflow. Impaired outlet protection refers to riprap that is not properly functioning. This can be caused by various issues such as the riprap surface being filled in with sediment or vegetation that smoothes out the impact surface or if the outflow drainage bypasses the outlet protection altogether. If the outlet protection is missing or damaged, then erosion of the outlet channel can occur. Debris that collects in the outlet protection should be cleaned out as a part of periodic routine maintenance. Items A through E are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).
- 10. Forebay;** A sediment forebay is a marshy shallow area constructed at the inflow point to the basin to increase the sediment trapping efficiency of the facility or to facilitate the routine removal of sediment from the facility. Because this area will accumulate sediment faster than the basin itself, it requires regular maintenance to ensure proper functioning. The forebay will have an overflow section on the outlet side to direct stormwater flows into the main area of the basin. Inspect the overflow area for erosion routinely.

11. Aquatic Landscaping: Root systems of plants store nitrogen and phosphorus, so adding them to a BMP design increases the pollutant removal efficiency of the facility. Typically they would be present on an aquatic bench around the perimeter of the pond or in the sediment forebay. Verify that the correct number and type of plants are present per the design on the plans.

12. Basin Area: This section pertains to all areas of the basin not addressed in the sections above. “Inflow obstructions” refer to the structures routing water into the basin from off-site drainage areas. Examples of inflow obstructions are sediment or vegetative growth in pipes, end sections, or riprap outlet protection as drainage enters the basin. “Obstructions to storage volume” are things that take up the required storage space in the basin needed during storm events. Obstructions to storage volume can be excessive growth in the bottom of the basin, or sediment build up, as compared to the elevations on the design plans. For example if the cattails have grown so thick their root mat is flush with the orifice hole, but the plans show 1’ of storage below the orifice hole then they are an obstruction to volume, because the 1’ of designed storage volume is not available to hold runoff. Verify that the vegetation was part of the design, in which case it may need thinning, and if not removal may be appropriate. Other items are defined in the definitions section. If the answer is “Yes” to any item, make an appropriate note in the remarks area explaining the observation(s).

Recommended Maintenance

The purpose of this section is to list any maintenance items that should be addressed for the facility to properly function in accordance with the plans. The inspection form should be filled out with maintenance items listed here, and submitted to Hanover County unsigned at the bottom. Once the maintenance items are complete, the consultant engineer should inspect the repairs, and if appropriate sign and date the certification on the bottom of page 4 of the inspection form. The signed page 4 should be submitted to the County.

Timing for the next inspection begins from the date the professional engineer certifies that the basin is functioning according to approved plans, or that the required repairs are complete. Typically certifications are due every three years, please see your recorded Maintenance Agreement for more information.

Definitions

Adequate Vegetated Cover: is a well established vegetated cover which minimizes the potential for erosion.

Bulges: are swollen areas that are indicative of material eroding or moving inside the dam.

Corrosion: is the decomposition of metal, and presents as rust that decreases the functional area of the structure. Most metal structures have a protective coating to prevent corrosion, but if metal is in contact with water chemical decay is unavoidable.

Crack: a split in the surface that creates a void. It can be as small as a hairline crack or large enough to see into the void below/beyond the original surface. Cracks may represent a weakness in the material and create a pathway for water and other unwanted materials to enter or exit the structure.

Erosion: is the wearing away of the land surface by water, wind, or ice. The best defense against erosion is stabilization with vegetation because the root structure holds the soil in place and the plant structure above ground slows down the flows.

High water marks: are visible indicators of high water levels once the pool has receded back to the normal elevation. Lines of debris may be visible along the face of the dam or in a spillway indicating how high the water rose during a storm event and how the facility performed.

Inlet: is the entrance or opening of a drainage structure.

Joints: are the interfaces where two pipes or sections of channel meet. If these structures are not properly connected they are prone to leaks or separation in this area.

Leakage: is flow improperly leaving a drainage structure, such as through a crack or unsealed joint in the pipe.

Misalignment/Irregularities: describes changes in the topographic surface of a structure.

Obstacles and Obstructions: are any type of blockage to the flow, usually caused by debris accumulating.

Outlet Channel: is the receiving channel where the basin discharges, natural or manmade.

Reinforcement: is the steel added to concrete for additional strength, usually as round bars or grid wire.

Riprap: is large rocks used to slow flows and prevent erosion. Riprap classes (e.g. Class I, Class II), are differentiated by size and weight. The size and footprint dimensions of the riprap in a given application will typically be shown on the design plans. If the placement details are not provided on the approved plans, riprap should be designed and repaired based on the requirements of the 1992 Virginia Erosion and Sediment Control Handbook (VESCH). If the riprap is displaced then the class of stone and/or footprint size is inadequate for the flows it is receiving.

Rodent Holes: are typically from beavers or muskrats and can usually be found along the waterline by walking and feeling for soft areas (burrows) or visually inspecting for fresh displaced soil. Their burrows can be quite extensive and create large voids in the dam. To repair we recommend backfilling with a non-erodible material such as concrete or grout.

Scaling: is when metal flakes off a metal surface.

Sediment accumulation or sedimentation: is the accumulation of silt in the bottom of a facility, which can impact the storage volume. While some sediment accumulation over time is expected, excessive sedimentation occurs from lack of maintenance or inadequate stabilization of upstream areas and must be removed for the facility to properly function.

Seepage: can present as a trickle flow out of the back of the dam, or more simply as an isolated area that remains wet. It is indicative of water finding a path through the dam. Seepage should be monitored to make sure dam material is not being lost. Seepage typically presents low on the back of the dam, well below the normal pool level.

Settlement: Soil can become more consolidated in response to weather conditions or its own weight over time. Settlement is a change in the vertical surface of dam, and can be isolated to one area or to the dam as a whole.

Spalling: is when concrete material flakes off a concrete surface.

Storage Volume: is the amount of water that the facility was designed to hold. If the bottom of the facility has filled in with sediment or extremely dense vegetation the storage volume may be reduced and the facility would

not meet applicable design requirements. Most facilities are designed to hold a certain amount of drainage over a defined time period to achieve the outflow goals or nutrient removal.

Trees: are a type of woody vegetation with a more significant root structure than grass. Trees and other woody vegetation should never be present on dams because the root structure weakens the embankment. Additionally the roots can die off and create a cavity in the dam and go unnoticed for years until it becomes a significant hazard.