



July xx, 2023

POLICY MEMORANDUM xx
(0x-2023)

TO: All Consultants, Developers, Regulatory Agencies and Others

FROM: Steven E. Darcey, CPESC
Executive Director

SUBJECT: Impoundment Facilities Adjacent to Steep Slopes

Policy Statement

It is the policy of the Prince George's Soil Conservation District (District) that the design and construction of impoundment facilities, regardless of how formed - by cut or a combination of cut and fill – consider proactively their potential failure modes and implement adequate and acceptable measures to mitigate against them. Impoundment facilities or structures adjacent steep slopes pose additional challenges for seepage control and embankment stability. This policy provides additional guidance for the design and construction of structures adjacent steep slopes, and supersedes all previous District guidance on this matter. It is supplemental to other similar guidance and policies by the Maryland Department of the Environment (MDE).

Background

The stability and long-term operation of excavated, or partially excavated impoundment facilities are critical factors in the design and construction of these systems. These factors are significantly amplified when these facilities are located adjacent to steep slopes given the increased potential for seepage flow paths to exit the face of the downgrade slope beneath the installed clay core and cutoff trench.

Steep slopes are hereinafter defined as any topographical mapping unit with a longitudinal cross slope of 15% or greater, as defined in the Prince George's Soil Conservation District, Soil Erosion and Sediment Control – Pond Safety Reference Manual (Manual).

Where this Policy Applies

This policy shall apply to all impoundment facilities located adjacent to downgrade slopes in excess of 15%.

Figure 1: An Impoundment Facility Adjacent a Steep Slope

Excavated Impoundments Adjacent to Steep Slopes

Excavated impoundments, or “dugout” ponds, refer to facilities meeting the below criteria per USDA-NRCS MD Pond Code 378 (MD-378), and applicable guidance from MDE:

- The pond is low hazard (class “a”). A truly excavated pond has limited potential failure modes;
- Embankment fill to complete the constructed top of dam is no greater than 2 feet in height above the natural ground surface; and
- The projection of L horizontally downstream from the pond bottom is below the existing or proposed ground, where $L = 10H + 20$ and H = height from the pond bottom to the constructed top of the dam, and the existing or proposed downstream ground slope within the projection of L does not exceed 10% at any point below the design storm water surface elevation plus one foot.

Presence of Potentially High Piping Material

The natural foundation materials of all impoundment facilities must be assessed by appropriate geotechnical investigations during design and construction activities. When seepage-prone, or potentially high piping materials – such as Unified Classes GM, SM and ML – are prevalent in the natural foundation sub-strata of a facility located adjacent steep slopes, an assessment of the potential for seepage flow paths to exit the face of the downgrade slope must be made. Appropriate measures must then be implemented to curtail this phenomenon. A stability assessment may be necessary.

Figure 2: An Excavated Impoundment Facility Adjacent a Steep Slope

Embankment Impoundments Adjacent to Steep Slopes

Impoundment facilities not meeting the criteria for being classified as “excavated” must be designed as embankment structures per MD-378, appropriate MDE guidance, and District policies. All embankment facilities adjacent to steep slopes must maintain the governing normal pool elevation against the embankment as meeting the excavated criteria. The normal pool elevation is herein defined as that corresponding to the 1-year extended detention.

Presence of Potentially High Piping Material

The presence of potentially high piping natural material in the foundation of impoundment facilities is of particular concern regarding dam safety. This concern is exuberated for partially excavated structures located adjacent to steep slopes given the potential for seepage flow paths to exit the face of downgrade embankment slopes below the installed clay core and cutoff trench.

The determination of natural foundation material must be made by appropriate geotechnical investigations during design.

The following are required when potentially high piping material is encountered in the foundation substrata to depths below the typical design elevations of the core and cutoff trench, or it is impractical to lower the impervious clay layer to key into appropriate foundation material:

- The governing elevation for the 10-year WSEL against the upstream embankment must meet the requirements of an excavated facility;
- A filter and drainage diaphragm must be installed on the outfall barrel. Additional foundation drains may be installed as assessed by the geotechnical engineer of record;
- A compacted clay liner must be installed along the bottom of the facility and extend up the embankment slopes to 10-year WSEL at a minimum.

The geotechnical engineer of record may also require the implementation of additional proactive measures for dam safety.

Environmental Site Design (ESD) Practices and their Location Adjacent Steep Slopes

Reiterating District policy, Submerged Gravel Wetlands (SGWs) must be evaluated as impoundment structures (ponds). An appropriate exemption may be applied for, as applicable, with the project’s application. These facilities must be designed and constructed as permanent stormwater management practices meeting the dictates of MD Code 378, and appropriate MDE guidance, where an appropriate exemption criterion cannot be met.

SGWs are also required to meet these updated requirements when located adjacent to steep slopes. Any determination of the height of embankment shall begin at the top of dam to the bottom of the gravel media, or the lowest point of excavation, (normally bottom of pipe spillway or concrete cradle), excluding the cutoff trench, along the centerline of the dam.

Figure 3: An Embankment Impoundment Facility Adjacent a Steep Slope

Figure 4: Seepage Control for a Facility Adjacent Steep Slopes

Determination of the Downstream Toe of Dam for Impoundments Adjacent to Steep Slopes

Embankment facilities must provide a non-woody buffer along the entire width of their breachable embankment. Crucial to the establishment of the non-woody buffer is the determination of the downgrade toe of the dam's embankment. Refer to the appropriate District and MDE policies for guidance.

Additional Information

Please contact the District at 301.574.5162 EXT. 3 should you have questions or require additional information relating to this policy.