



DAM SAFETY
POLICY MEMORANDUM #1

TO: Dam Owners, Operators, and Engineers

FROM: Stormwater, Dam Safety, And Flood Management Program
Water and Science Administration

DATE: February 25, 2019 (Updated August 3, 2020, April 23, 2024)

SUBJECT: Maintenance and Repair: Trees and Woody Vegetation

Policy Statement

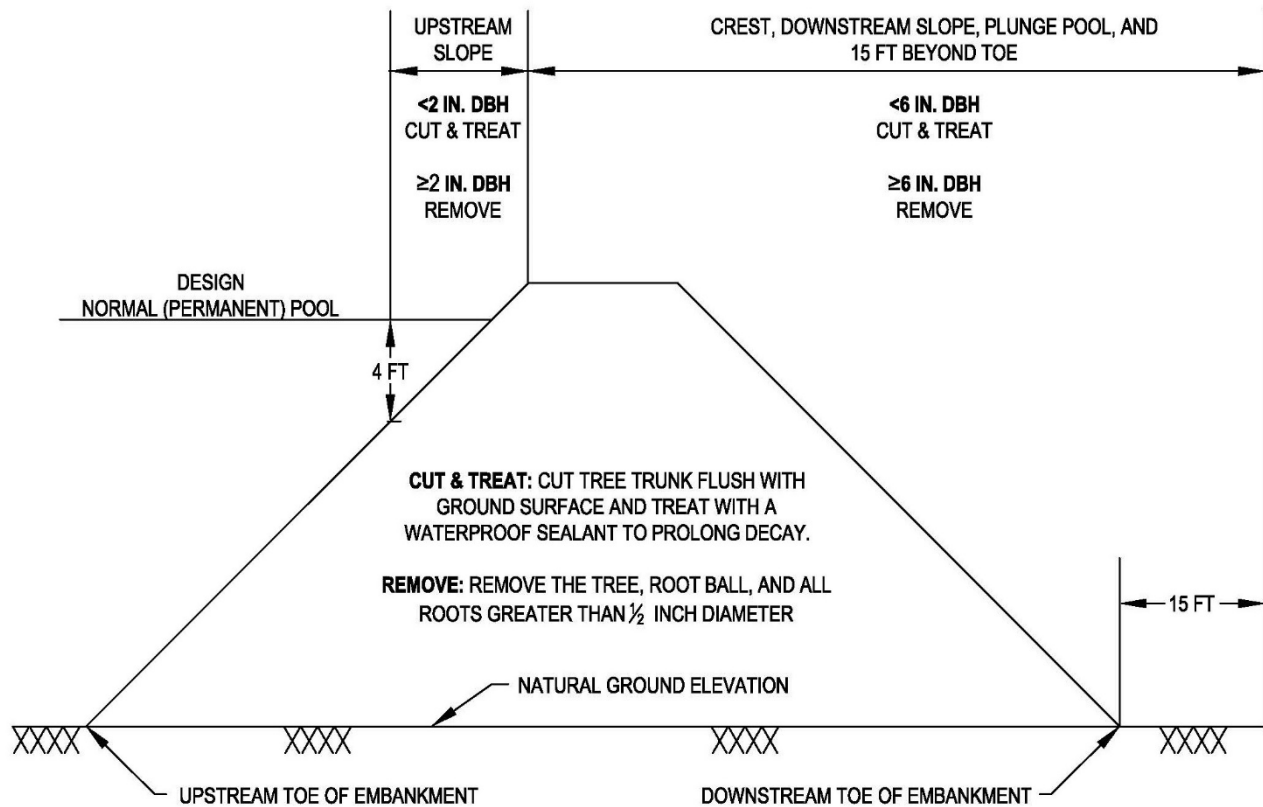
It is the policy of the Maryland Department of the Environment (the Department) that trees and other woody vegetation shall not be permitted to grow on or near dams or their appurtenant works. Prompt removal of woody vegetation in accordance with this policy is required of all dam owners in the State of Maryland.

Background

The growth of trees and woody vegetation negatively affects the integrity of the dam structure. Extensive root systems can weaken and loosen the soil matrix and provide seepage pathways for water. Trees that blow down or fall over can leave large holes in the embankment that can lead to increased erosion, loss of freeboard, and even failure of the dam. Brush obscures the surface and limits visual inspection, provides a haven for burrowing animals, and retards growth of non-woody vegetation. Tree and brush growth adjacent to concrete walls and structures may eventually cause damage and must be removed.

Removal of Trees and Woody Vegetation

Dam owners must maintain all areas of the dam free from trees and woody vegetation. These include areas within 15 feet of the upstream and downstream toe of embankment; within a 25-foot radius of the control structure; and within 15 feet of the abutment contacts, outlet, spillway area, and plunge pool. In emergency/auxiliary spillway channels, trees and woody vegetation must be removed in the zone extending 15 feet (horizontal) from the bottom edge of the spillway channel, or to a point two (2) feet above the water surface elevation in the channel during the design storm, whichever is greater. Where trees and woody vegetation exist in these areas, the extent of remedial activities (flush cut or full removal) will depend on the location and size of the tree, as presented in Figure 1. Removal of the stump and root ball and placement of controlled embankment fill material must be performed in accordance with detail TR-1 “Removal of Woody Vegetation on Dams”.



Notes:

1. Diameter at breast height (DBH) refers to the tree trunk diameter measured at 4.5 feet above the ground.
2. For dams with no permanent pool, tree cutting and root removal shall extend 15 feet beyond the toe of the upstream slope.
3. Trees within the 25-foot “no-tree” zone around spillways, but greater than 15 feet from the upstream slope shall be removed or cut flush to the ground and treated regardless of DBH.

Figure 1: Tree Cutting and Removal Zones

Where the limits of the dam embankment are unknown or uncertain, the dam owner must coordinate with the Dam Safety Division, local Soil Conservation District, or other approving agency as designated by the Department to determine the appropriate extents of removal. The extents of removal should be based on a conservative estimate of the dam embankment location, with the understanding that tree removal is in the best public interest as it can reduce the potential for dam failure. Establishment of an arbitrary delineation without clear physical changes (e.g., slope changes, barriers such as guardrails, fence lines) should be avoided to ensure that maintenance crews have a clear understanding of “maintain” versus “no-maintenance” areas in the future after trees have been removed and acceptable vegetation has been established.

Removal of the stump and roots of a tree and placement of embankment fill may require a permit from the Department’s Dam Safety Permits Division for any dam listed on the Maryland Dam Inventory. For low hazard dams not on the Dam Inventory, approval may be required from the appropriate approval authority (the local Soil Conservation District, the Department’s Plan Review Division, or other delegated entity). It is important to note that in many cases wet pool elevations

will need to be drawn down prior to vegetation removal. Where a significant portion of the embankment will be disturbed due to the removal of a large number of trees, or where the removal of the trees may impact the spillway, internal drains and filters, the impervious core, or other dam appurtenances, special details must be provided by a Maryland registered professional engineer for review by the appropriate approval authority.

Restoration of Disturbed Areas

Following tree removal activities, a dense cover of low-growing grassy vegetation must be established where the earth has been disturbed or in areas of sparse ground cover. Grassy vegetation is recommended because it will provide protection from surface erosion, but its root structure does not penetrate the embankment so deeply as to weaken the dam structure. Deeper-rooted grasses should be planted in vegetated earth spillways. Seeding should be accomplished between optimum planting dates. Seeding late in the year may result in winterkill of young seedlings. The following spring an inspection of the seeded area should be made to determine if plant survival is satisfactory.

Before seeding, topsoil, fertilizer, and lime must be applied. Application rates will vary with soil type and condition, and can be determined by having the soil tested. The fertilizer and lime should be raked, disked or harrowed into the soil to a depth of not less than three (3) to five (5) inches. Periodic fertilization is necessary to maintain vigorous vegetation. Immediately following seeding, the area should be mulched.

Recommended seeding mixtures, planting dates, and fertilizer application rates for dams are provided in Appendix B-4-5, "Standards and Specifications for Permanent Stabilization" in the *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control*.

Intentional Plantings on Roadway Dams

The Department allows a limited exception to this policy for planting of certain trees or similar woody vegetation along the crest of roadway embankments used as dry stormwater management structures (i.e., those structures that act as dams, rather than culverts) where required per local ordinances. While planting trees on roadway embankments is discouraged, the following conditions must be met to allow limited woody vegetation plantings:

1. The structure shall have no permanent wet pool.
2. The dam shall be classified as low hazard only.
3. The structure shall have a minimum of three (3) feet of freeboard between the peak 100-year water surface elevation (WSEL) and the lowest point on the crest of the dam.
4. The width of the dam embankment measured three (3) feet above the peak 100-year WSEL shall be no less than 50 feet.
5. Woody vegetation planting is acceptable only on the top of the dam along the edge of the roadway. Woody vegetation planting shall not be permitted on the side slopes.
6. Woody vegetation planting is not permitted within 15 feet from the spillway, toe, or abutments of the dam.
7. Planting may consist only of trees or shrubs with a shallow root system (less than three (3)

feet depth) when mature. A landscape plan showing the type and location of plantings shall be submitted for review and approval by the appropriate authority. The plan shall be prepared by a Maryland registered landscape architect with a note certifying that the proposed plantings have a shallow root system. Planting must be intentional. Volunteer tree growth is not acceptable.

Figure 2 illustrates acceptable and unacceptable applications of this policy exemption.

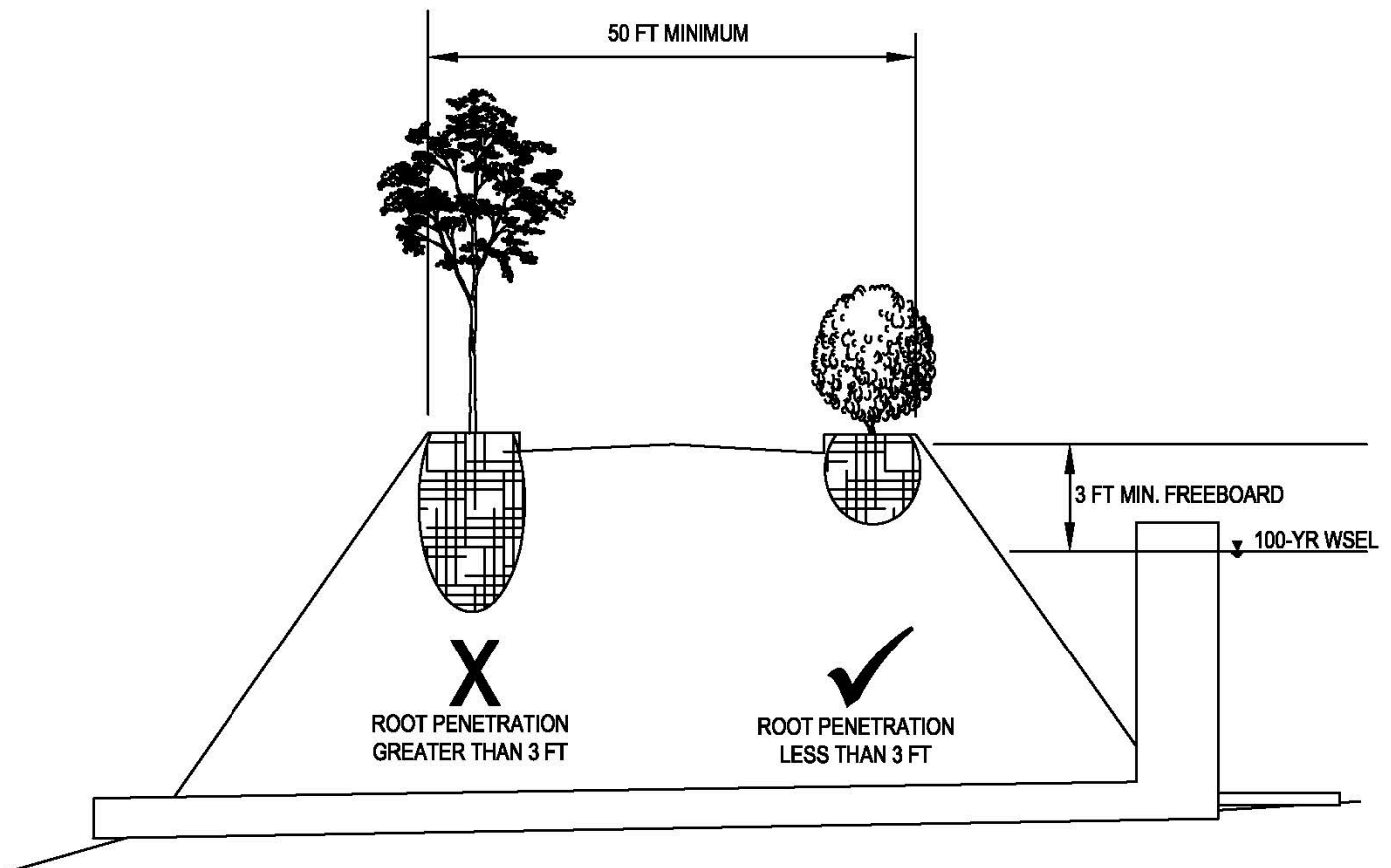


Figure 2: Plantings on Dams Used as Roadway

Managing Tree Growth on Superwide Roadway Dam Embankments

The Department recognizes that in some cases, a road or railway embankment is particularly wide in relation to a typical water-retaining embankment dam, while the volume of water impounded against the embankment is relatively small, and accordingly many potential failure modes are unlikely or less likely to be applicable. Such embankments (dams or small ponds) are deemed “superwide”, as defined in [Dam Safety Policy Memorandum #5](#).

The Department also recognizes that many linear transportation embankments are not widely understood to also serve as dam embankments by maintenance personnel. Accordingly, maintenance practices tend to allow for the growth of trees in woody vegetation.

For embankments where the approval authority (MDE Dam Safety, SCD, or Department's designee) has accepted a superwide classification, limited woody vegetation may remain provided the dam owner develops a Woody Vegetation Management Plan (WVMP) and submits the WVMP to the approval authority for review and approval. An entity responsible for multiple superwide dams/ponds may submit a single WVMP for their jurisdiction provided it lists the locations covered by the WVMP. Where the limits of the superwide embankment are not clear or questioned, contact MDE Dam Safety to determine the embankment limits.

The WVMP and subsequent vegetation management actions must include the following:

- Evaluation of existing woody vegetation on the embankment by a Maryland Department of Natural Resources Licensed Tree Expert to identify and flag for removal trees that pose an unacceptable risk to the embankment by virtue of being diseased, dying, having structural deficiencies, or being located where the root system is likely to damage dam safety elements (e.g., roots over top of spillway, roots penetrating internal drains, roots likely to penetrate impervious core). Visual indicators of unacceptable woody vegetation include, but are not limited to the following:
 - Trunk leaning over 25 degrees or more from vertical.
 - Soil heaving or uprooting on the opposite side of the lean.
 - Trees located in an area with slope instability (e.g., erosion, cracking, slumping)
 - Asymmetric canopy distribution (>75% of canopy area on one side of trunk)
 - Roots are exposed or undercut (>50% of root plate)
 - Damaged roots (work involves major root cutting within a distance of 5x the diameter of the trunk)
 - More than half (>50%) of the tree appears to be dead.
 - Dead branch(es) present (>35% of crown area dead)
 - Cracks or splits extending into the wood (beyond bark cracks)
 - Cavities, decay, or fungi present on trunk(s) or branch(es) with cavity decay >25% of trunk or branch diameter.
- Plan/Strategy to trim, prune, or thin the remaining woody vegetation not identified as posing an unacceptable risk to provide visibility and access for inspections and maintenance (e.g., clear lower branches to minimum 6 feet above ground level). This includes removal of all brush and weeds, and all trees with diameter at breast height (DBH) equal to or less than 4 inches.
 - Rootballs may be left in place but must not inhibit maintenance activities.
 - Woody vegetation must be removed within 25 feet of riser/inlet structure.
- Plan/Strategy for ongoing maintenance and monitoring to prevent or remove new woody vegetation growth, and to identify trees that pose an unacceptable risk to the embankment.
- Acknowledgement that new planting of woody vegetation, or restoration of woody vegetation removed for other purposes/projects will not occur.

Where known deficiencies on the embankment slope (e.g., slumps, cracks, slides) or spillway exist, they must be addressed before a WVMP is approved. Failure to adequately implement the WVMP may result in compliance actions including a requirement to remove all woody vegetation.

Additional Information

For additional information on this subject, refer to “Technical Manual for Dam Owners – Impacts of Plants on Earthen Dams”, Chapter 5 – Controlling Tree and Woody Vegetation Growth (FEMA 534/September 2005).

Questions about this policy or other items relating to ponds and dams can be directed to the Chief of the Dam Safety Permits Division at 410-537-3552.