



**Baltimore County
Soil Conservation District**

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**OPERATION AND MAINTENANCE
PLAN GUIDELINES**

Name of Project _____ Small Pond Approval _____

S.C. Approval # _____

The following are items to be considered in the preparation of an Operation and Maintenance plan (O&M). By checking applicable items, these guidelines may be used as a standard O&M plan if deemed appropriate by the design engineer, or may be used in the preparation of a custom O&M plan (complete signature section required). O&M is to be designed to ensure that the facility continues to operate in a safe and effective manner and that problems are prevented or quickly identified and corrected. The O&M is to be in conformance with this document, NRCS MD 378, and the Maryland Dam Safety Manual published by the Department of the Environment, Water Management Administration – Dam Safety Division.

In general, operation items are required for the following major areas: Embankment, Reservoir, Spillway and Outlet Works.

The term “owner” used in these operation and maintenance plan guidelines refers to the original permittee, and any heirs, successors, or assigns.

OPERATIONS

I. Support Data

_____ **A. Background Information** - The owner should maintain a complete up-to-date as-built plan and design specifications for the dam. A copy of the completed Small Pond Sheet (MD-ENG-14) should be available.

_____ **B. Record Keeping** - Written records of maintenance and observations should be kept. Photographs are valuable for recording observations and changes.

II. Inspections

_____ **A. Inspection Guidelines** - Owners are to make a visual inspection at least once a year. Inspections are to be made after extreme rainfall events. Owners are encouraged to have an inspection by a registered professional engineer at least once every 5 years.

_____ **B. Dam Inspection Checklist** - Shall be included as part of the operation and maintenance plan, and completed at least triennially. See Appendix A of NRCS MD Conservation Practice Standard - Pond (Code 378) for the checklist. A visual inspection shall be conducted on an annual basis to detect blockages of the principal and emergency spillways that would cause the facility to not function as designed. In addition, if there are any visible trees, shrubs, or other woody growth on the embankment at time of annual inspection, it shall be removed prior to the next inspection.

III. Emergency Procedures

- A. Surveillance** - Inspect daily or more often under adverse conditions of heavy or extended rainfall, flash flood warnings or snow melt. Inspect for overtopping failures, piping or seepage failures, and structural failures. If any of the following conditions are noted, emergency procedures are warranted; muddy water is flowing from the downstream slope or toe; cracks or depressions are forming on the embankment; or flood flow over top of the embankment is imminent.
- B. Mitigation** - Provide for lowering the reservoir or sandbagging before overtopping. Action to be taken for piping includes lowering the pool and attempting to plug the upstream end with suitable material.
- C. Notification** - Time permitting, consult a professional engineer experienced in dam design and operation to determine the extent of damage and necessary repairs. Before major repairs, contact Baltimore County Soil Conservation District (District) or Maryland Dam Safety Division for approval. In the case of anticipated dam failure, the local fire and rescue or police department should be notified regarding the potential emergency. The ultimate responsibility for implementation of a warning plan, that includes the danger reach, rests with the dam owner.

MAINTENANCE

IV. Embankment

- A. Vegetation** - Proper vegetation is required on earth dams. The proper selection of grasses, seeding rates, planting dates, and vegetation maintenance is available in MD NRCS Standards and Specifications for Critical Area Planting (MD-342) or the current MD Standards and Specifications for Soil Erosion and Sediment Control.
- B. Trees and Brush** - Trees and shrubs will not be allowed on the embankment. Trees that have been allowed to grow on the dam shall be removed completely, including all roots. Craters resulting from the tree root removal shall be re-filled with the appropriate soil, and compacted (see MD-378 Construction Specifications) until design grades are achieved.
- C. Mowing and Brush Removal** - Mowing is necessary to control the establishment of woody growth and to maintain the vegetative cover. The embankment, a fifteen (15) foot wide buffer strip adjacent to the toe, upstream and downstream of the embankment, and the area within 25 feet of the control structures need to be mowed.
- D. Erosion and Slope Protection** - The rate of erosion is directly related to the lack of vegetation. Prompt repair of eroded areas is required. Vegetation should be inspected in the early spring and late summer, and any bare or eroded areas repaired and reseeded. Problem erosion areas of pedestrian traffic or abutment contacts should be controlled with filter cloth and rock rip-rap. The upstream face of a dam can be protected from wave erosion by the same method.
- E. Seepage** - Must be controlled in quantity and velocity to minimize damage to the dam. Regular monitoring to detect wet areas, “spring” flow, “piping” and “boils” on the downstream embankment should be done. Excessive seepage pressure can threaten the downstream slope stability. Seepage flow which is muddied by soil is evidence of “piping” and “boils”. When this occurs complete failure may happen within hours and professional advice should be obtained immediately. Typical methods used to control the quantity of seepage are installation of an upstream blanket, or the installation of drainage trenches or drains. All of these designs must be approved by the District before installation.

_____ **F. Stability** - Large cracks, slides, sloughing and excessive settlement are signs of embankment distress and indicated that remedial work is required. Soil added to restore an embankment must be properly “keyed” into the base material. Repair of these conditions is not considered routine maintenance and must be approved by the District.

_____ **G. Rodent** - Control of rodents such as beavers, groundhogs and muskrats is required as they can damage structural integrity and performance of the embankment and spillway. Groundhog and muskrat burrows serve as pathways for seepage. Beavers may plug the spillway and raise the pool level. Rodent removal and elimination of burrows is required when encountered.

_____ **H. Crest of Dam** - Should be graded to direct all surface drainage into the impoundment. Where access roads cross the dam any ruts that develop should be repaired as soon as possible.

V. Spillway and Outlet Works

_____ **A. Conduits** - All conduits should be inspected thoroughly once a year. Inspect for improper alignment (sagging), elongation and displacement at joints, cracks, leaks, surface wear, loss of protective coatings, corrosion and blockage.

_____ **B. Trash Racks** - The trash rack unit should be checked periodically and especially after storm events. Accumulated debris should be removed and maintenance performed if necessary. Under no circumstances should the trash rack be removed for an extended period. Annual maintenance for corrosion protection should be provided.

_____ **C. Concrete** - Surfaces should be inspected for cracking, spalling, displacement or movement, and deterioration by weathering, chemical reactions or leaching. Extensive cracking, slab or wall movement, large areas of exposed reinforcing steel and severe undermining require professional advice and District approval before repairs can be made. Minor repairs of patching, grouting, and coatings can be performed during routine maintenance.

_____ **D. Vegetated Earth Spillways** - An emergency spillway is designed to pass infrequent large flood flows around the dam to prevent overtopping. The vegetative cover should be maintained the same as the embankment to provide a vigorous grass cover. Prompt repair of erosion damage and removal of flow obstructions are required.

_____ **E. Outlet** - Erosion at the spillway outlet is a common maintenance problem. Severe undermining, displacement of pipes and dam failure can occur. Often the outlet is adequate for normal flow, but not for extreme storm flows. Periodically, and especially after storm events, the stilling basin, plunge pool, or rip rap energy dissipator should be inspected. Provide prompt repair of damages.

_____ **F. Drains/Mechanical Equipment** - Drains should always be operable to provide draw down in the case of an emergency or for necessary repairs. The gate or valve controlling the drain should be operated fully at least once each year or as recommended by the manufacturer. It should be inspected and all appropriate parts lubricated and repaired before operations. Annual maintenance of metal operating mechanisms should be performed by keeping parts greased or painted to prevent corrosion. All equipment controls should be checked for proper security to prevent vandalism.

