

# OPERATION AND MAINTENANCE PLAN GUIDELINES

**Project Name:** \_\_\_\_\_

**Pond Address:** \_\_\_\_\_

**Pond No./ID:** \_\_\_\_\_

**Accepted by Owner:** \_\_\_\_\_ **Date:** \_\_\_\_\_

The following are to be considered in the preparation of an Operations 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 COMAR 26.17.04.

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 property owner(s) where the pond embankment, spillway and appurtenant works are located.

## OPERATIONS

### **I. Support Data**

- A.) Background Information – The owner shall maintain a complete up to date as-built plan and design specifications for the dam. A copy of the completed Small Pond Sheet (MDE Form: PO-1 dated 4/2022) 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 three (3) years.
- B.) Dam Inspection Checklist – Shall be included as part of the operation and maintenance plan and completed at least triennially. A visual inspection shall be conducted on an annual basis to detect blockages of the principal 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 the 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 the damage and necessary repairs. Before major repairs, contact the Maryland Dam Safety Permits 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 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 the current MD Standards and Specifications for Soil Erosion and Sediment Control.
- B.) Tree 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 in accordance with Dam Safety Policy Memorandum No. 1.
- 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 eroding 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 abundant 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 must 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. Non-emergency repairs must be approved by the Dam Safety Permits Division 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 Dam Safety Permits Division.
- G.) Rodent Guard – 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. When 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 joint, 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 reinforced steel and severe undermining require professional advice and Dam Safety Permits Division 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 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 for necessary repairs. The gate or valve controlling the drain should be operated fully at least once a 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.

V. Reservoir

A.) Pool Level – When it is necessary to draw down the pool level it should be done gradually over a period of time to prevent slope failures. An annual inspection of the pond/lake perimeter should be done. Potentially damaging fallen trees, debris, and sediments should be removed. Periodic removal of floating debris to prevent clogging of the spillways should be done. During extended periods of severe freezing weather inspection for ice damage or ice formation at the spillways and outlets should be performed.

VII. Additional Requirements

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