



## 3.0 Conclusions and Recommendations

### 3.1 Dam Classification and Considerations

None of the dams would currently be classified or regulated in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) Bureau of Dam Safety due to current embankment height (<25 feet) and impoundment storage (<50 acre-ft). In addition, if the dams are owned and maintained by York County, they are considered exempt. However, due to the proposed public use and possible roadway construction over the embankments, it is highly recommended that all dams be remediated to perform within minimum requirements of classified dams of similar size. It should be noted that remedial measures to increase embankment heights or storage may change the classification of a dam.

In summary, all of the embankments will require some remedial repairs to the outlet structures and/or embankments to provide adequate long-term performance in accordance with South Carolina Dam Safety requirements. Based on the results of the preliminary field testing and site observations, several particular issues were noted with regard to the condition of the existing embankments and outlet structures that would potentially impact the long-term performance of the embankments. The following is recommended for all dams:

- Remediate embankments to meet minimum requirements as specified by SCDHEC regulations.
- Design all spillways to pass the minimum design storm and to maintain the minimum freeboard as specified by SCDHEC regulations.
- We recommend that S&ME, Inc. be included in the design and permitting of any remedial improvements to the dam embankments and outlet structures.

### 3.2 Remedial Recommendations

The following recommendations are provided to remediate each dam to SC dam safety requirements. Due to the heavily wooded conditions, embankment size, and outlet improvements required (removal and replacement); the complete removal of the existing embankments will generally be required for all Dams, except Dam 2. This is due to the embankments size, the undercut required to remove existing pipes, tree stumps and roots and/or existing unsuitable fill or alluvial materials within the existing embankments. The dams would then be reconstructed with a designed principal and emergency spillway structures and new embankment materials. For long term performance of all the dams, all burrowing rodents and beavers should be removed or controlled from the project site.

Alternatively, the ponds can be dewatered and the existing embankments breached to eliminate the pond and any dam repairs required. The minimum remedial measures recommended for each dam are as follows:

#### 3.2.1 *Dam 1*

- Dewater existing pond.

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- Remove trees including stump, rootmat, brush, from upstream and downstream slopes and abutments of the dam and vegetate with grass.
- Remove and control burrowing rodents and beavers from dam banks.
- Repair any sloughing or undermining on the dam banks.
- Remove any existing outlet devices and pipes within the embankment.
- Construct an appropriately sized, functioning principal spillway and stilling basin.
- Construct an appropriately sized, functioning emergency spillway or repair the existing rock channel to handle emergency spillway flow conditions.

### 3.2.2 Dam 2

S&ME understands the park entrance is proposed to use improvements to the existing gravel road located downstream and below Dam 2. As an alternative, S&ME recommends that Dam 2 can be improved to include a wider crest that could include the entrance road located on top of Dam 2 crest. A "Dam 2 Conceptual Improvement Plan" is included as Figure 2A and 2B in **Appendix I**, showing the general design concept with the new entrance road rerouted to traverse across the Dam 2 embankment. This alternative would require less removal of the existing embankment while providing an overall safer condition than a roadway located below an existing dam embankment. This alternative would generally include:

- Dewater existing pond.
- Remove grass, trees and brush from slopes and abutments of the dam and vegetate with grass.
- Remove existing principal and emergency spillway pipes and structures.
- Bench into existing downstream slope and remove alluvial soil from toe and middle of embankment area.
- Install internal toe drains along existing groins to a center chimney drain.
- Construct an appropriately sized, functioning principal spillway and stilling basin.
- Construct an appropriately sized, functioning emergency spillway capable of handling emergency spillway flow conditions.
- Design and build-out the embankment wider to include new roadway, shoulder, sidewalk etc. per site designs by others.

Improvement to Dam 2 could also include the complete removal and replacement similar to Dam 1 instead of the above alternative.

### 3.2.3 Dam 3

- Dewater existing pond.
- Remove trees including stump rootmat, brush, from upstream and downstream slopes and abutments of the dam and vegetate with grass.
- Remove and control burrowing rodents and beavers from dam banks.
- Repair any headcutting, undermining, or erosion on the dam banks.
- Remove any existing outlet devices, including the 8" ductile iron pipe sleeved within the 10" reinforced concrete pipe, as well as the 10" ductile iron pipe above the toe and the 3" ductile iron pipe halfway up the downstream slope.
- Construct an appropriately sized, functioning principal spillway and stilling basin.

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- Construct an appropriately sized, functioning emergency spillway capable of handling emergency spillway flow conditions.

#### 3.2.4 Dam 4

- Dewater existing pond.
- Remove trees including stump rootmat, brush, from upstream and downstream slopes and abutments of the dam and vegetate with grass.
- Remove and control burrowing rodents and beavers from dam banks.
- Remove construction debris from dam embankments.
- Remove any existing outlet devices, including the 18" PVC riser pipe, the 4" ductile iron outlet pipe, and the 4" plastic pipe at the right abutment.
- Construct an appropriately sized, functioning principal spillway and stilling basin.
- Construct an appropriately sized, functioning emergency spillway capable of handling emergency spillway flow conditions.

#### 3.2.5 Dam 5

- Dewater existing pond.
- Remove entire embankment and all outlet devices until suitable soils are encountered.
- Construct an appropriately sized, functioning principal spillway and stilling basin.
- Construct an appropriately sized, functioning emergency spillway capable of handling emergency spillway flow conditions.

#### 3.2.6 Dam 6

- Dewater existing pond.
- Remove trees including stump, rootmat, brush, from upstream and downstream slopes and abutments of the dam and vegetate with grass.
- Remove and control burrowing rodents and beavers from dam banks.
- Repair any sloughing or undermining on the dam banks.
- Remove any existing outlet devices and pipes within the embankment.
- Construct an appropriately sized, functioning principal spillway and stilling basin.
- Construct an appropriately sized, functioning emergency spillway.

#### 3.2.7 Dam 7

- Dewater existing pond.
- Remove trees including stump, rootmat, brush, from upstream and downstream slopes and abutments of the dam and vegetate with grass.
- Remove burrowing and control rodents and beavers from dam banks.
- Repair any sloughing or undermining on the dam banks.
- Remove any existing outlet devices and pipes within the embankment.
- Construct an appropriately sized, functioning principal spillway and stilling basin.
- Construct an appropriately sized, functioning emergency spillway.

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#### 3.2.8 *Dam 8*

- Dewater existing pond.
- Remove trees including stump, rootmat, brush, from upstream and downstream slopes and abutments of the dam and vegetate with grass.
- Remove and control burrowing rodents and beavers from dam banks.
- Remove any existing outlet devices and pipes within the embankment.
- Construct an appropriately sized, functioning principal spillway and stilling basin.
- Construct an appropriately sized, functioning emergency spillway.

#### 3.2.9 *Dam 9*

- Dewater existing pond.
- Remove trees including stump, rootmat, brush, from upstream and downstream slopes and abutments of the dam and vegetate with grass.
- Remove and control burrowing rodents and beavers from dam banks.
- Remove any existing outlet devices and pipes within the embankment.
- Construct an appropriately sized, functioning principal spillway and stilling basin.
- Construct an appropriately sized, functioning emergency spillway.