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New Meadows Lake Tidal Restoration Feasibility Study Preliminary Alternatives Summary

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Preliminary Alternatives Summary

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Following are brief descriptions of six preliminary alternatives at Bath Road. For comparison, the measured tidal range in New Meadows Lake during the Phase 1 analysis period was 2 feet (ft), and the maximum and minimum water surface elevations were 97.9 and 95.9 ft, respectively. *Note that the tidal range presented above is the difference between maximum and minimum water levels over a two week period, and is greater than the typical tidal range during a single tide.*

Preliminary Alternative 1: Deeper Culvert at Existing Location

Preliminary Alternative 1 considered the case of a square (box) culvert of the same width as the existing box culvert (12 ft) with the bottom, or invert, of the culvert set 2.5 ft below the invert of the existing culvert. The culvert was assumed to have the same overall length as the existing culvert, with wingwalls supporting the adjacent embankment.

Implementation of Preliminary Alternative 1 would result in relatively small changes to water surface elevations in the lake, with similar water levels in the upper and lower sections of the lake. The calculated normal tidal range for this alternative is 2.4 ft, and the maximum and minimum water surface elevations are 97.4 and 95.0 ft, respectively.

The evaluation of Preliminary Alternative 1 assumed that rock outcrops in the existing channel connecting the culvert to the lower section of the lake were lowered slightly. Absent removal of the bedrock, it is likely that this slightly larger culvert would provide only minimal changes in tidal flow as the bedrock elevation is approximately the same as the lowered culvert bottom.

Preliminary Alternative 2: Wider and Deeper Culvert at Existing Location

Preliminary Alternative 2 considered the case of a 24-foot wide box culvert twice the width of the existing culvert, with the bottom of the culvert 4.5 ft below that of the existing culvert. Modeling was performed with the assumption that the bedrock outcroppings adjacent to the existing culvert in the lower section of the lake would be removed to provide additional flow capacity. The culvert was assumed to have the same overall length as the existing culvert, with wingwalls supporting the adjacent embankment.

Implementation of Preliminary Alternative 2 would result in substantial changes to water surface elevations in the lake. The calculated water levels in the lower section of the lake would result in a normal tidal range of 7.1 ft and maximum and minimum water surface elevations of 99.5 and 92.4 ft, respectively. The calculated water levels in the upper section of the lake would result in a normal tidal range of 3.1 ft and maximum and minimum water surface elevations of 97.9 and 94.8-ft, respectively.

As with Preliminary Alternative 1, implementation of Preliminary Alternative 2 on the existing culvert alignment would require the removal of bedrock adjacent to the culvert in the lower section of the lake.

Preliminary Alternative 3: Two Larger Culverts at New Location

Preliminary Alternative 3 considered the case of a pair of box culverts, each with widths of 24 ft, with their bottoms set 7.5 ft below the invert of the existing culvert. This alternative would be appropriate for installation at a new

location along the Bath Road causeway and would require a substantially longer culvert. For this analysis, a culvert length of 80 ft was assumed.

Implementation of Preliminary Alternative 3 would result in substantial changes to water surface elevations in the lake. The calculated water levels in the lower section of the lake would result in a normal tidal range of 11.3 ft and maximum and minimum water surface elevations of 100.4 and 89.1 ft, respectively. The calculated water levels in the upper section of the lake would result in normal tidal range of 3.5 ft and maximum and minimum water surface elevations of 98.7 and 95.2 ft, respectively.

Implementation of this alternative would require a new culvert alignment through the Bath Road causeway.

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Preliminary Alternatives Summary (*Continued*)

Preliminary Alternative 4: Single Larger Culvert at New Location

Preliminary Alternative 4 considered the case of a single box culvert with a width of 24 ft and its bottom set 7.5 ft below the invert of the existing culvert. As with Preliminary Alternative 3, this alternative would be appropriate for installation at a new location along the Bath Road causeway and would require a substantially longer culvert. For this analysis, a culvert length of 80 ft was assumed.

Implementation of Preliminary Alternative 4 would result in substantial changes to water surface elevations in the lake. The calculated water levels in the lower section of the lake would result in a normal tidal range of 10.0 ft and maximum and minimum water surface elevations of 100.0 and 90.0 ft, respectively. The calculated water levels in the upper section of the lake would result in a normal tidal range of 3.2 ft and maximum and minimum water surface elevations of 98.4 and 95.2 ft, respectively.

Implementation of this alternative would require a new culvert alignment through the Bath Road causeway.

Preliminary Alternative 5: Composite of Existing and New Culverts

Preliminary Alternative 5 considered the case of the culvert modeled in Preliminary Alternative 4 without the removal of the existing culvert.

Implementation of Preliminary Alternative 5 would result in substantial changes to water surface elevations in the lake. The calculated water levels in the lower section of the lake would result in a normal tidal range of 9.9 ft and maximum and minimum water surface elevations of 100.0 and 90.1 ft, respectively. The calculated water levels in the upper section of the lake would result in a normal tidal range of 3.3 ft and maximum and minimum water surface elevations of 98.5 and 95.2 ft, respectively. These values are similar to those determined for Preliminary Alternative 4. The evaluation of this alternative suggests that benefits associated with Preliminary Alternatives 4 and 5 are approximately equivalent.

Implementation of this alternative would require a new culvert alignment through the Bath Road causeway.

Preliminary Alternative 6: Bridge with Invert Below Mean Low Water

Preliminary Alternative 6 considered the case of a bridge with a bottom width of 30 ft set below mean low water in the lake. The bridge opening was modeled with a channel length of 70 ft and side slopes set at a slope of 1.5:1 (horizontal:vertical).

Implementation of Preliminary Alternative 6 would result in substantial changes to water surface elevations in the lake. The calculated water levels in the lower section of the lake would result in a normal tidal range of 12.0 ft and maximum and minimum water surface elevations of 100.5 and 88.5 ft, respectively. The calculated water levels in the upper section of the lake would result in a normal tidal range of 3.4 ft and maximum and minimum water surface elevations of 98.7 and 95.3 ft, respectively. These values are similar to those determined for Preliminary Alternatives 4 and 5.

Implementation of this alternative would require a bridge alignment through the Bath Road causeway.