14 Island Lake Dam
Inspection Report

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Persons Present:
Bryon Keene, P.Eng.
Harry Stinson
Brett Dark (14 Island Lake Association)
Peter Peart (14 Island Lake Association)

The dam is a concrete gravity structure approximately 6' high x 21' long x 5' thick (see Figure 1). The sluiceway opening is 2.5' and is controlled by stop logs made of dimensional 2" lumber. The stop logs appeared to be 2 x 10 (8?) material.

Figure 1: Upstream View of Dam

At the time of the visit the water level was approximately 18" below top of dam with 2" of water flowing over the top log. There was about 4.5' of head on the dam.

Using the sharp-crested weir formula the outflow was:

$$Q = 1.84LH^{3/2}$$

Where:
Q = flow in cms
L = length of weir = 0.76 m

H = depth of flow over weir = 0.05m

$Q = 1.84x0.76x0.05^{3/2}$
Q = **0.016** cms or 16 l/s

Condition of Dam
The downstream portion of the dam is in good condition. This section was constructed in 1994 to buttress up the dam. The left abutment upstream portion is in poor condition and has some significant cracks. In places there are cavities between the upstream face and downstream portion. Photo 8 shows the most prominent cavity.

Within the sluiceway there is also some concrete loss and deterioration. This can be seen in Photos 3 and 4. Most deterioration is on left side (Photo 3) where some voids have developed.

The joint between the former structure and the concrete mass added in 1994 is apparent in Photos 5, 6 and 9. There is some efflorescence at this joint. In places vegetation has taken root in the joint and voids in the older upstream portion (Photo 9).

At the connection of the right abutment to the exposed rock foundation, some leakage is evident (Photo 10). Further downstream more leakage can be seen through rock joints (Photo 11). This is not significant. Leakage was not observed at the left abutment, however, the large pile of debris did not permit close inspection.

The gains (log openings) are formed with steel angle embedded in concrete. The steel is in good condition where it can be seen. However, leakage through the concrete near the left gain is noticeable (Photo 3). We were not able to determine the condition of the logs, but they were holding water with relatively little leakage.

In the headpond sediment has accumulated to a depth of about 4' (Photo 5). Beaver activity is also evident as cuttings have either been placed by beaver or simply collected at the dam. A large pile of debris has been deposited presumably by the dam operator on the left embankment (Photo 1).

There is a side wingwall that has been placed presumably to reduce embankment damage during overtopping events (Photo 12). The wingwall is fabricated of masonry and is generally intact, but appears frail. Suggest this have some rip-rap material approximately 12" in diameter to provide support on downstream side and reduce potential for embankment erosion.

Operation
The dam operator was not present during the inspection. There was no operation plan found in our records and no knowledge of any guidance on how the dam should be operated. The bay would have a low capacity and the entire dam would be overtopped during large runoff events. There would also be little potential for operation during an extreme event as the operator must walk across the top of the dam to get to the log bay. It would likely be unsafe to operate as waters would be overtopping the dam.

Shoreline erosion is very evident around the lake. Tree roots are exposed and many trees are leaning into the lake. Soil loss is also obvious.

Summary and Recommendation

The dam is in fair condition overall. Some portions are deteriorated and should be repaired. There is no evidence of overall dam movement in rotation or sliding. Leakage that was observed in the right abutment contact was not significant.

Repairs

Concrete repairs should take place by chipping out the loose sections, particularly those over the old structure on the left embankment, to a depth of about 6". If possible, rebar should be dowelled into upstream and downstream masses to join these more cohesively. Approximately 7' x 5' x 6" deep of surface area should be chipped away and recapped on the top of the left abutment. Approximately 5' x 4' x 6" depth of loose concrete in the sluiceway on left side should also be chipped away and recapped.

Operation

The dam should have an improved operations plan to reduce the shoreline erosion. The plan should consider reducing water levels in the lake during high spring flows and place logs back in the dam to hold summer levels. Consideration should be given to installation of shorter log increment for top logs (ie to allow finer control of water level).

The current water level is too high for the shoreline to resist erosion from wave action. Consideration should be given for a reduced water level.

Photo Library

Photo 1: Upstream View of Dam

Photo 2: Downstream View of Dam

Photo 3: View of Left Sluice Wall (Notice leakage and concrete loss)

Photo 4: View of Right Sluiceway (Vertical crack at joint)

Photo 5: Log Bay (Concrete deterioration of left abutment can be seen)

Photo 6: Left Abutment Showing Deteriorated Concrete

Photo 7: Left Abutment Showing Location of Void

Photo 8: Void in Concrete, Left Abutment

Photo 9: Right Abutment (Upstream deterioration, vegetation growth)

Photo 10: Leakage through right abutment / rock interface

Photo 11: Leakage through rock just downstream at right embankment

Photo 12: Upstream bank protection left side