



TO: Board of Directors

FROM: Rob Baldwin
General Manager, Planning & Development and Watershed Restoration Services

Brian Kemp
General Manager, Conservation Lands

DATE: July 16, 2020

SUBJECT: Pefferlaw Dam Ownership Review, Structural Assessment, and Recommendations

RECOMMENDATION: THAT Staff Report No. 36-20-BOD regarding Pefferlaw Dam Ownership Review, Structural Assessment, and Recommendations be received; and

FURTHER THAT the following recommendations be approved:

1. That the Board direct Authority staff to complete remedial welding on the truss supports of the Pefferlaw Dam as soon as possible.
 2. That the Board approve a request to the Town of Georgina to share the cost to complete the remedial welding works.
 3. That upon completion of the welding repairs, Authority staff install the stoplogs, and following the Dam Operational Plan remove them again in the Fall to comply with provincially approved operating protocols.
 4. That the Authority maintain the closure to pedestrian access over the bridge on the dam structure.
 5. That the Authority continue to seek confirmation of ownership of the dam structure from the Province.
 6. That the Authority, with the Town of Georgina, undertake community consultation regarding the current and future status of the Pefferlaw Dam.
 7. That the Board approve a recommendation that the Authority permanently discontinue operation and stoplog management of the Pefferlaw Dam after the fall 2020 removal of the stop logs.
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Purpose of this Staff Report:

The purpose of Staff Report No. 36-20-BOD is to provide the Board of Directors with an update on ownership and the findings of the Pefferlaw Dam structural assessment and recommendations.

Background:

The Pefferlaw Dam is located in the Town of Georgina on the eastern edge of the village of Pefferlaw and is comprised of two parcels of land (Attachment 1) on either side of the dam and spillway. A dam has been located at this site since the 1880s. Originally, the dam was constructed and used for the purpose of powering mills onsite and on adjacent lands.

In its current state, the dam is essentially a local amenity. It is an aesthetic and historical focal point within the village and it creates a small reservoir that provides recreational benefits to local residents (ex. canoeing, kayaking, paddling) and dedicated water access for a small number of private residential properties.

The Lake Simcoe Region Conservation Authority (the Authority) has operated the Pefferlaw Dam since the early 1980s after the adjacent properties were conveyed to the Authority by the Town of Georgina, to access government funding to repair and rehabilitate the dam. After the repairs were completed, our records indicate that the dam was intended to be transferred back to the municipality; however, for reasons that are undocumented, the transfer never happened. To that end, the Authority has continued, in-good-faith, to operate the dam annually with the installation and removal of stoplogs and flashboards to create the reservoir.

In the fall of 2019, the Authority retained D.M. Wills Associates Limited to undertake a visual inspection to provide information regarding the condition, operation, and safety of the dam. A Dam Inspection Report, dated December 2019 identified 10 recommendations. The highest priority issues were identified as follows: concrete in a number of locations on the dam is in poor condition and repairs were required for the flashboards and posts (this work was completed by Authority staff); and erosion behind the downstream armour stone retaining walls that required immediate minor work to ensure the truss/railing is sufficient for fall arrest and as an anchor point for maintenance staff.

Due to staff safety concerns the decision was made to not install the stop logs in the dam structure until a detailed assessment of the dam could be completed. Staff brought forward a series of recommendations to the delayed March 2020 Board of Directors' meeting (held instead on April 3rd due to COVID-19). The recommendations included requesting clarity on dam ownership from the Province, undertaking a detailed structural and safety assessment of the dam and when appropriate, consultant with the Town of Georgina, the Province, and the community on the future of the dam.

Issues:

1. Dam Ownership Update

The Authority retained Premier Title Services Inc. in 2019 to complete a detailed investigation into the ownership titles and chain of custody for the Pefferlaw Dam and the two parcels on either side of the dam. Based on the detailed investigation only a small section of the eastern side of the dam falls within the eastern parcel that was conveyed to the Authority (Refer to Attachment 1), therefore prompting Premier Title Services Inc. to deduce that ownership of the dam remains inconclusive. The general assumption dating back to the 1980s was the ownership, maintenance and operation of the dam was included as part of the two parcels of land on either side. It was not until the detailed property title review was commenced that the dam ownership was identified as being in question.

The two parcels adjacent to the dam were conveyed to the Authority from the Town of Georgina in 1982 for the sole purpose of accessing provincial dam infrastructure funding available to conservation authorities. The intent was to complete the dam reconstruction and repairs and return the lands to the Town of Georgina. This transfer never occurred.

In order to confirm who owns the dam, with Board of Directors approval, staff have requested that the Ontario Ministry of Natural Resources and Forestry (MNRF) undertake an investigation into the ownership of the dam and associated lands. This includes the lands which the reservoir occupies when at full pool. MNRF recently notified staff that due to the current closure of Ontario ministry buildings, a formal response will not likely be provided until staff are able to return to their office and access archives and historic files.

2. Structural Assessment of the Pefferlaw Dam

The Authority retained D.M. Wills Associates Ltd. to undertake a detailed structural assessment of the dam and associated bridge, truss, and safety supports. The inspection work completed by D.M. Wills Associates Ltd. included concrete assessment of the dam, detailed inspections of the bridge and truss, a loadings and structural assessment of the bridge and truss and provision of recommendations with cost estimates for rehabilitation work. The detailed report can be found attached (Attachment 2). A summary of these results and recommendations follows:

Structural and Concrete Assessment:

- The concrete assessment indicated there are three areas requiring remediation:
 - The outer concrete areas of the dam are in poor to fair condition with delamination, spalling, scaling and some cracks in the face of the dam;
 - The eastern dam abutment is recommended for full replacement; and
 - The eastern slab needs partial replacement or significant grouting.

The above-mentioned works are recommended to occur within the next one to five years. The cost estimate for these remedial works is \$368,065. The cost for design and technical supervision is \$55,210. The total cost estimate excluding staff time and administration is \$423,275.

Bridge and Truss Assessment:

A detailed bridge and truss assessment was completed including a detailed load model to evaluate impacts from variety of uses and to evaluate adequacy and function. The assessment concluded that the truss can be operated safely at this time, as long as critical welding repairs are completed prior to operation. The findings also concluded that the operation truss either be completely rehabilitated or replaced within 5 to 10 years to realize the life 75-year life span of the dam.

Two alternatives were presented:

- Truss rehabilitation at an approximate cost of \$52,650, OR
- Truss replacement at an approximate cost of \$61,750.

These cost estimates do not include technical oversight or administration. A life cycle cost analysis was completed to compare the alternatives to evaluate best value. The analysis concluded that the full replacement of the truss was the preferred alternative as it had a lower life cycle cost due to reduced maintenance into the future. The total cost estimate including \$9,260 for design and supervision is \$71,010.

The condition of the pedestrian bridge is similar to the condition of the operational truss. The rehabilitation of the bridge can be completed, or it can be replaced if the operational truss is to be replaced. The approximate construction cost for truss and bridge rehabilitation is \$137,159 and the cost for full truss and bridge replacement is \$165,570. The total cost estimates including design and supervision are respectively \$157,732 and \$190,430. These cost estimates do not include staff time or administration. These works are recommended to be completed in the next 5 to 10 years.

Operational Status:

In the immediate future, the dam can be returned to operational status upon completion of the remedial repairs and welding to the operational span truss. The approximate cost for these repairs including welding, oversight and staff time is \$5,000 to \$6,000.

If this work is completed by the beginning of August, this will allow the reservoir to be viable for the remaining 2020 season. Water levels will increase dependent on flow during the period of stoplog and flashboard installation.

The fall arrest system is adequate but does not extend across the entire dam structure. Future recommendations include a full extension of the system.

The operational status of the dam into the future is dependent on the remedial and restoration works required and recommended by D.M. Wills Associates Ltd. If it is determined that the dam

should remain operational beyond 2020, the dam rehabilitation and concrete substructure restoration work must be completed within the next one to five years to ensure the integrity of the structure, annual operation and to meet its intended 75-year design life.

General Recommendations and Costs:

There is substantial remedial work required in the next decade if the dam is intended to be maintained to meet the original 75-year design life.

Immediate work to operate the dam in 2020 is minor with a cost of \$5,000 to \$6,000. This work could be completed in a short timeframe and the stoplogs could be placed into the dam following normal protocols. This typically takes a few weeks to complete and the timeframe is dependent on flow rates of the river.

The recommendations for concrete rehabilitation and truss replacement put the approximate cost for these total works at an estimated \$494,285. If it was determined that full replacement of the truss and bridge were preferable, the total cost of all remedial and rehabilitation works would be approximately \$613,705.

3. General Issues

Flood Control Structure:

The Pefferlaw Dam was not designed or built to be a flood control structure. There has been some misconception in this regard as often dams can be used to mitigate flooding by storing excess water. This is not the case with the Pefferlaw Dam which is wholly used to create an artificial reservoir for recreation purposes. The dam itself actually poses a flood risk in the winter and spring which is why the Authority undertakes the removal of the stoplogs every fall to reduce the risk of ice jams that could lead to a dam failure.

Given that the Pefferlaw Dam has no role in flood control, low water augmentation, waste assimilation or as a drinking water reservoir, the benefit of the structure is strictly for recreation. Its continued operation by the Authority has been a legacy to support the Town of Georgina and otherwise this activity does not fall within the mandate of the Lake Simcoe Region Conservation Authority. Our current watershed development policy prohibits the creation of on-line ponds or impoundments, and the benefits to removing on-line structures to restore natural waterways are well defined and documented to improve ecological health.

This knowledge is the rationale behind the Lake Simcoe Region Conservation Authority stewardship efforts to remove or mitigate the impacts of online ponds and dams. As such, we have provided funds and sought grant money to assist with dam removal projects. One of the most recent, and very successful examples of this, was our own significant dam bypass and rehabilitation project at Scanlon Creek. The Scanlon Creek dam was constructed in 1970 to replace an old mill dam and was a concrete structure similar to the Pefferlaw Dam. Costs to remove the structure were prohibitive,

therefore a bypass channel was created in order to remove the reservoir and restore the Scanlon Creek to its natural form allowing for fish passage. This project was extremely successful and Scanlon Creek and the surrounding ecology are now thriving.

Impact on Authority Finances:

To operate the dam for the remainder of 2020 is relatively inexpensive with costs estimated at \$5,000 to \$6000 to complete remedial welding excluding supervision and oversight.

The total cost estimate to implement the required engineering recommendations is either \$494,285 or \$613,705, based on either remediation or full replacement of the truss and pedestrian bridge. These cost estimates do not include technical oversight, administration, or staff time.

The Authority does not have the reserve or capital budget available to undertake the recommendations outlined in the dam inspection report. As the structure is not for the purpose of flood control there is no ability for the Authority to seek funding through the province under the Water Erosion Control Infrastructure program.

Summary and Recommendations

The Pefferlaw Dam and reservoir are a significant recreational asset to the local community and in one form or another, has been in place for well over a century. The Pefferlaw Dam provides no formal flood control function, but rather is operated annually by installing and removing stoplogs to prevent the flood risk created by the dam in the winter and early spring seasons.

In principle, the Authority does not support the existence of dams unless they provide flood mitigation, low flow augmentation, waste assimilation functions, and/or are drinking water reservoirs.

The two parcels adjacent to the dam were conveyed to the Authority from the Town of Georgina in 1982 ~~In 1982, the property and dam were conveyed to the Authority from the Town of Georgina~~ for the sole purpose of accessing dam maintenance funding from the Province. Upon completion of the rehabilitation works in the 1980s, the property was to be transferred back to the Town. For reasons that are not documented, this transfer has not occurred. The maintenance of the two abutting properties is still completed by the Town, with dam operations conducted by the Authority.

There are several challenging issues regarding the Pefferlaw Dam:

- The costs to rehabilitate the dam to meet the 75-year life cycle are substantial.
- The Authority does not have reserve or capital budget available to rehabilitate or maintain the dam or a mechanism.

The following is a list of recommendations for consideration by the Board for next steps moving forward.

1. That the Board direct Authority staff to complete remedial welding on the truss supports of the Pefferlaw Dam as soon as possible.
2. That the Board approve a request to the Town of Georgina to share the cost to complete the remedial welding works.
3. That upon completion of the welding repairs, Authority staff install the stoplogs, and following the Dam Operational Plan remove them again in the Fall to comply with provincially approved operating protocols.
4. That the Authority maintain the closure to pedestrian access over the bridge on the dam structure.
5. That the Authority continue to seek confirmation of ownership of the dam structure from the Province.
6. That the Authority, with the Town of Georgina, undertake community consultation regarding the current and future status of the Pefferlaw Dam.
7. That the Board approve a recommendation that the Authority permanently discontinue operation and stoplog management of the Pefferlaw Dam after the fall 2020 removal of the stop logs.

Pre-Submission Review:

This Staff Report has been reviewed by the Chief Administrative Officer.

Signed by:

Rob Baldwin
General Manager, Planning & Development
and Watershed Restoration Services

Signed by:

Brian Kemp
General Manager, Conservation Lands

Signed by:

Michael Walters
Chief Administrative Officer

Attachments

1. Parcel Map of Pefferlaw Dam and Abutting Properties
2. Pefferlaw Dam Assessment Report – July 2020