Grand River Conservation Authority

Report number: GM-11-24-105

Date: November 22, 2024

To: Members of the Grand River Conservation Authority

Subject: Water Control Structures Major Maintenance Forecast 2025 - 2029

Recommendation:

THAT Report Number GM-11-24-105 – Water Control Structures Major Maintenance Forecast – 2025-2029 be received as information.

Summary:

Not applicable.

Report:

This report provides an overview of proposed major maintenance spending on Grand River Conservation Authority (GRCA) dams and dikes for the period of 2025-2029.

The GRCA owns and operates 28 dams. Seven of the GRCA dams are actively used to manage flows within the watershed and are classified as multi-purpose dams. The multi-purpose dams serve two key functions: managing floods and supplying water to the river during periods of low flow (flow augmentation) . Auxiliary benefits such as hydro production and recreation result from the operation of the dams. In October 2024, the GRCA completed

The GRCA's other 21 dams are generally run-of-the river dams or earthen embankment dams with small head ponds. Although the smaller dams do not serve a water management function, they are important community features. These smaller dams may also serve a local fire suppression role providing a primary source of water needed to aid fire suppression. The New Dundee Dam provides a primary source for fire suppression for the community of New Dundee. The Wellesley Dam would provide a secondary or backup source for fire suppression in the community of Wellesley.

Four main techniques are used to identify deficiencies with dams:

1. Dam safety reviews are comprehensive reviews conducted by outside engineering firms. During the dam safety review, the dam is examined to ensure its design and construction meet current standards. Dam safety reviews can identify deficiencies with a dam and make recommendations for upgrades. Periodic dam safety reviews may be conducted at dams where comprehensive reviews have been completed. Periodic reviews can identify new issues that require attention. These reviews help form the basis for long-term major maintenance planning and asset management.
2. Detailed technical investigations are less comprehensive than a dam safety review and focus on a specific component of a dam. They are normally conducted by outside engineering firms. Technical investigations examine specific components of a dam, for example, the gates or electrical systems at a dam. These detailed technical investigations may recommend technical work be completed on the specific component and help provide information for the major maintenance forecast. These technical investigations may be completed to develop detailed designs to address a specific issue.
3. An annual inspection program identifies deficiencies with the dams and places repairs on a five-year forecast. At the large dams, engineer inspections are carried out in the spring after the reservoirs are filled, and again in the fall after the reservoirs are emptied. The other

dams are inspected in the spring. After the inspections are completed, repairs are prioritized, and the financial forecast is adjusted.

4. The large dams operated by GRCA are visited daily by dam operators. Dam operators complete daily visual inspections and report issues or incidents to engineering staff. Emergency or ad-hoc inspections of issues or incidents are completed as needed and further detailed investigations or actions are completed as needed. Daily inspections are an important part of the dam safety program at GRCA. Financial forecasts are adjusted as needed.

The major dike systems in Brantford, Cambridge, and Kitchener (Bridgeport) are inspected each year. Procedures for completion of third-party dike safety reviews and technical investigations continue to be refined. They follow a similar approach used for the dam safety reviews but are focused on technical aspects of dike safety. Dike safety reviews have been completed for the Bridgeport, Brantford, and Cambridge dikes. Detailed technical investigations and major maintenance works are being completed on specific components of these dike systems. Guidelines from other jurisdictions have been consulted to develop terms of reference for dike safety reviews. This approach is being taken in the absence of provincial technical guidelines.

The two big risks associated with the large water control infrastructure are the inability to operate gates at the large dams to safely discharge flood flows and the inability of the large dam or dikes to hold back flood water.

Three of the large dams operated by the GRCA rely solely on gates to discharge flood flows; these include Shand, Conestogo, and Woolwich Dams. Other large dams like Guelph, Luther, Laurel Creek, and Shades Mills dams have the ability to passively discharge flood water either by an emergency spillway or overflow relief. Special emphasis has been focused on gate operational reliability at the large dams operated by GRCA. Several measures have been implemented to improve operational reliability including some projects in the 2025-2029 major maintenance budget.

With regard to the large dikes in the communities of Brantford, Cambridge, and Kitchener (Bridgeport), work has been completed to identify the capacity of these dikes to convey floods. Technical studies have been completed or are underway to identify deficiencies that could result in the inability of these dikes to safely contain flood waters to the channel between the dikes including the Bridgeport Dike Rehabilitation and Capacity Improvement Class Environmental Assessment to address stability and increase the level of protection provided by the dike. The 2025 major maintenance budget identifies the Brantford Dike Ice Jam Mitigation Class Environmental Assessment to advance recommended alternatives to provide additional protection from the impacts of ice jam flooding through the Brantford reach.

2025 Major Maintenance Forecast - Dikes

An Environmental Assessment of options to increase the capacity of the Bridgeport dikes is being completed. Currently, the Bridgeport dikes have the capacity to convey approximately the 100 year flood in any given year. The capacity study will investigate options to increase the capacity of the Bridgeport dikes to convey larger events up to the Regulatory flood. The Environmental Assessment will select the preferred solution. The cost of implementing repairs and improvements is estimated to be $4,500,000 in the 2026 to 2028 forecast. These estimates will be refined once preferred solutions are identified and detailed designs are completed. This work is being funded through a combination of Federal (DMAF) and Provincial (WECI) funding.

In the City of Cambridge, work on the dikes will focus on repair of floodwall construction joints in association with the west bank floodwall upstream of Parkhill Dam.

Following the February 2018 ice jam event that resulted in overtopping of sections of the Brantford dikes, forensic technical investigations were initiated in 2018 to identify the cause of

ice jams in the Brantford dike reach and potential mitigation measures that can be taken to reduce the risk of future ice jams overtopping these dikes. That work was completed in the spring of 2019. In 2020 and 2021, worked focused on further investigating and refining mitigation options to reduce the potential for future ice jams. Work in 2025 will focus on completing an Environmental Assessment of specific mitigation options, and detailed design preferred options. Capital works to implement options are included in the capital forecast for 2026 to 2028. Forecast costs of mitigation options will be refined as detailed designs are completed. Staff will determine if any additional federal funding grants may be applicable for this project.

In the community of Drayton, background work has been completed to estimate the benefits and budgetary costs to extend the existing dike upstream of the community of Drayton to allow passage of the 100 year flood in any given year. This background work can be used to support an application by the Township of Mapleton to the federal funding for flood mitigation projects as available. The flood damage estimates, used to assess the benefits mitigation protection, also included updating floodplain mapping through the community of Drayton. Public meetings will be scheduled to present results along with any changes to the regulatory floodplain through the community of Drayton.

The budget forecast includes continued vegetation maintenance along the New Hamburg dike following a recommendation from the flood mitigation study completed for the community of New Hamburg.

2025 Major maintenance Forecast - Dams

The Shand Dam project focuses on completion of isolation stoplog fabrication and gains refurbishment. The temporary stop log system is needed to allow isolation of the gate for maintenance and inspection while reservoir levels are above the gate crest.

The multi-year concrete repair project is continuing at Conestogo Dam with upstream concrete repairs in the forebay on the upstream side of the control structure in 2024 and 2025. The final phase of repairs on the downstream spillway are included in the 2026 to 2027 forecast.

Work at Guelph Dam will focus on a Dam Safety Review update to be completed in 2028 which will identify specific projects to address any deficiencies.

An automated gate operating system will be designed and implemented at Woolwich Dam. Woolwich Dam does not have an emergency spillway. Gate 1 of the dam is designed to automatically operate in the event of an unanticipated rise in reservoir levels. The automatic gate operation of Gate 1 is a safeguard. The existing control and operating system is at the end of its design life and in need of replacement.

A Dam Safety Review will be completed at Laurel Dam in 2026, which will provide recommendations for future maintenance and rehabilitation work, including rip rap replacement around the control structure.

A Dam Break Inundation Mapping and Hazard Potential Classification study is being undertaken for Shades Mills Dam in 2024. This work will support the completion of a Dam Safety Review in 2025, which will assess seepage and geotechnical issues and provide recommendations for piezometer and relief well monitoring.

Repairs at Luther Dam will focus on replacement of a toe drain in the embankment in 2025.

Work at Baden Dam will include an embankment repair and installation of a toe drain to address seepage issues.

Major studies and work are proposed at Wellesley Dam to address embankment seepage and flow capacity issues. Work in 2025 will focus on design and approvals and on implementation of automated gate controls.

Channel bank repairs design and construction will be completed at Wellington St. Dam in the channel directly downstream of the dam in 2025.

The following are attached:

Table 1 - High-level summary of the five-year forecast by program area, dikes, multi-purpose dam or small dam, and by specific structure in each program area.

Table 2 - Details of the expenditures proposed for the next five years, for the dike, multi-purpose dams, and small dam programs.

If a DS or a DR number is assigned to a project in the table, it means that provincial funding has been approved for 50% of the project cost. For future projects, DR-Future and DS-Future indicate future repairs and studies that are eligible but may or may not receive provincial funding. In 2024, the Ministry of Natural Resources Water and Erosion Control Infrastructure (WECI) grant funding program initiated a two-year application and approval timeline. As such, the GRCA has received confirmation of successful projects that may commence in April 2025.

Funding considerations:

The City of Kitchener was successful in obtaining DMAF funding in 2019. The City of Kitchener allowed the GRCA to include as part of its application, funding for improvements and repairs to the Bridgeport dikes. The DMAF program provides 40% funding. Therefore, for eligible Bridgeport dike repairs and studies, the funding formula would be 40% federal DMAF, 30% provincial WECI and 30% GRCA. In Table 2, DR-DMAF has been noted beside eligible projects to identify multiple funding sources.

Applying to federal programs like the NDMP and DMAF are examples of how the GRCA attempts to leverage municipal levy and provincial WECI funding.

Financial Implications:

2025

The water control structures major maintenance 2025 budget is set at $3,000,000. Forecast spending for 2025 is $5,039,400 (See Table 1). GRCA has received notification regarding successful funding of projects submitted for the provincial Water Erosion Control Infrastructure (WECI) program for projects planned for the provincial fiscal year April 1, 2025 to March 31, 2026. Not all GRCA projects submitted received funding for the 2025 fiscal year, however $1,587,534.00 of provincial funding for 50% of the successful projects has been secured.

The 2025 Budget Draft #1 spending of $3,000,000 is being funded with $750,000 Municipal Apportionment, $1,450,000 provincial WECI grants, and $800,000 from Land Sale Proceeds Reserve. The final approved 2025 Budget will be adjusted accordingly based on 2024 carryover projects and approved WECI projects.

2026 to 2029

Forecast spending to range between approximately $2.8 and $ 7.0 million (See Table 1 attached). The five-year forecast typically includes $1.5 million in spending. Savings from underspending are placed into the water control structures reserve and overspending is funded via a combination of WECI funding, other government grants or programs (i.e. the Federal Disaster Mitigation DMAF), or use of reserves as applicable.

If federal DMAF becomes available for projects, the cost-sharing arrangement would be: 30% general municipal levy, 30% WECI grant, and 40% DMAF grant.

As of December 31, 2023, the water control structures reserve balance is $3.1 million dollars. Certain projects may also be eligible for funding from the land sale proceeds reserve which as of December 31, 2023, is $23.0 million .

Future project costs will be updated as designs are completed and estimated costs are refined.

Future Changes to Funding Under the Conservation Authorities Act

At this time, it is staff's understanding that the provincial WECI program will continue to fund major maintenance of water control structures dams, and dikes as has been the case in the past, including dams that may only provide a local amenity feature. Matching funding would be required from the local conservation authority or municipality. The budget forecast provided assumes continued WECI funding for the full range of dams operated by the GRCA.

The changes to the Conservation Authorities Act required the GRCA to develop an asset management plan for water control structures. GRCA's Water Control Infrastructure Asset Management Plan was approved by the GRCA Board in October 2024, and capital expenditures from the Plan have been incorporated and/or updated in this report.

Other Department Considerations:

Not applicable

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