Subject: Gross Budget Increase for DeCew Water Treatment Plant Lower Reservoir Berm Repair

Report to: Public Works Committee

Report date: Tuesday, July 11, 2023

Recommendations

1. That the capital budget adjustment in the amount of $2,500,000 gross **BE APPROVED** for the Decew Water Treatment Plant Lower Reservoir Berm Repair and **BE FUNDED** through the Capital Variance – Water Project.

Key Facts

- The purpose of this report is to seek Council approval for an increase to the gross budget for Project 20001380 (DeCew Lower Reservoir Berm Repair) by $2,500,000 for emergency construction works required to repair the lower reservoir berm and spillway abutment water leakage. The proposed increase will be funded through the Capital Variance Water Project which has a current balance of $6,880,710.
- Per the Budget Control By-Law section 6.5(c) iii), Council approval is required for budget adjustments greater than $250,000.
- Leaking water was discovered at the base of the lower reservoir berm next to the spillway and slide. The leakage was being monitored by Region staff while WSP was retained through a Special Circumstance procurement to investigate the source of the leak, design a repair solution and obtain appropriate approvals from the Ministry of Natural Resources and Forestry (MNRF).
- During the investigation period, the leakage developed significantly. Through consultation with MNRF, it was determined that repairs to remediate the leakage from the spillway and berm should commence immediately before detrimental loss or damage occurs.
- Upon approval of the gross budget adjustment, emergency construction will proceed in accordance with Niagara Region Procurement By-law 02-2016 as amended on February 28, 2019, Section 17 Special Circumstance as this leakage, if not immediately addressed, is likely to cause significant loss or damage to property.
- The berm repairs will take place in two phases; Phase 1 includes construction of an access road, cofferdam and syphon system, dewatering of the undermined spillway area and further investigations. Phase 2 will include detailed design and construction of permanent berm and spillway repairs.

- Phase 1 works commenced in June 2023 funded through Water Operations Repairs and Maintenance Budget. This council request for funding is to support Phase 2.

Financial Considerations

In the 2021 budget cycle, council approved a construction budget for Project 20001380 (Reservoir and Storage Program) for $500,000 (including non-refundable HST) to repair the lower bank of the berm between the lower reservoir and the spillway slide that feeds Decew. The current request of $2,500,000 (including non-refundable HST) is required for a special circumstance and emergency construction to facilitate detailed design of the repair solution, construction of the spillway and berm repairs and site restoration which results in a total adjusted budget of $3,000,000 (including non-refundable HST).

Per the Budget Control By-Law section 6.5(c) iii), Council approval is required to increase the budget by $2,500,000 gross to complete construction of this project. The proposed increase will be funded from the Capital Variance Water Project and staff confirms the current balance of uncommitted funds in this Project prior to this current request is $6,880,710.

A full budget breakdown can be found in Appendix 3 to Report PW 29-2023 Total Estimated Project Cost.

Analysis

- The raw reservoir system at Decew WTP is fed from the Ontario Power Generation canal and is made up of an upper, middle and lower reservoir with weirs, berms and control structures managing the water flow. In addition to water stored in the reservoirs for raw water supply for drinking water production, water flows from the middle reservoir to a spillway along the west side of the reservoirs. The spillway leads to a slide structure and plunge pool sending water to Morningstar Mill, flowing over Decew Falls and into Twelve Mile Creek. The reservoirs, spillway and slide structure are owned and maintained by Niagara Region.
- During routine checks, Decew Plant staff discovered water leaking through the base of the lower reservoir control berm. A capital project was initiated through the DeCew WTP Water Storage and Reservoir Program to investigate the leak.
- In March of 2021, WSP (previously Wood PLC) was retained through Special Circumstance procurement as a subject matter expert to investigate the leak source and design the required repairs. Multiple studies and analysis were completed by WSP including site investigations, geotechnical investigations and dive inspections.

Through these investigations, several points of leakage were discovered within the west side of the lower reservoir berm. A berm repair design was developed and submitted to MNRF for approval while further investigations took place to pinpoint the spillway leakage.

- During the investigation period, staff have continued to monitor the leak and in the spring of 2023 the conditions noticeably worsened. A site meeting was held with Niagara Region staff, WSP and MNRF. It was determined that repairs to remediate the leak from the spillway and berm should commence immediately before detrimental loss or damage occurs. MNRF will be kept advised as the work progresses and the final repairs will be incorporated into the current application under the Lakes and Rivers Improvement Act.
- Repairs to the spillway and berm will take place in two phases In Phase 1, a contractor will construct an access road and cofferdam, install a bypass syphon within the spillway to isolate flows to the slide and leakage area while maintaining water supply to the Morningstar Mill, excavate the upstream apron section of the slide and conduct further investigations to determine the extent of erosion caused by water seepage and repairs required. In June 2023, Rankin Construction was retained through Special Circumstance procurement under the Water Operations Repairs and Maintenance Budget to commence Phase 1 work. WSP's initial assignment was extended to provide construction and investigation support during Phase 1.
- Phase 2 will begin immediately following Phase 1 and will include detailed design of the repair solution and construction of the permanent spillway and berm repair works. The detailed scope associated with the permanent repairs will not be fully determined until Phase 1 work is complete. Based on investigations completed to-date, existing spillway and dam drawings and subject matter expert input, the anticipated spillway repairs will include repairs to the existing concrete inlet slab and foundation of the spillway's sidewall, replacement of damaged discharge pipe and replacement of the sub-grade system below the spillway. Repairs required for the berm will include slope flattening, partial overburden removal at the toe area of the berm, followed by trench excavation and filling to facilitate construction of a new buttress berm. Site restoration will be complete including removal of all construction materials and planting of native trees within the access road area.
- During the Phase 1 investigation works, Region water staff will take the opportunity to inspect the two culverts that feed water from the plunge pool to Morningstar Mill, running underneath DeCew Road. If preventative maintenance is required, the work will be captured in Phase 2.

- According to the latest Dam Safety Review (DSR) by Hatch in 2016, Decew Lower Reservoir Berm is classified as a dam with “High” Hazard Potential Classification (HPC). The HPC rating is determined by evaluating the life safety, property, environmental and cultural-built heritage losses resulting from a dam break flood conditions. The DSR determined a break in the DeCew Lower Reservoir Berm could result in loss of life between 1 and 10 people, irreversible damage to the heritage buildings and infrastructure at the Morningstar Mill, moderate damage to two houses and one barn on 1st Street Louth, infrastructure damage on DeCew road and flood flows in the main Twelve Mile creek.
- In addition to the losses identified in the HPC, in the event of a berm breach Decew staff would not be able to control water levels in the raw water reservoir system. This would create a high risk to plant operation and our ability to provide clean drinking water.
- To avoid the major risks associated with a berm break, Phase 1 commenced under the Water Operations Repairs and Maintenance Budget as emergency works. A gross budget increase of $2,500,000 is required to proceed with the Phase 2. This increase amount is based on the anticipated repairs in consultation with subject matter experts. The budget increase includes costs for WSP to complete the detailed design and provide construction inspection and support, costs for Rankin Construction to complete the permanent repairs and for rehabilitation of the construction area, internal costs and contingency.

Alternatives Reviewed

The following alternatives were reviewed:

Do nothing:

- This alternative does not address the needs of repairing the leaks around the Decew Berm and spillway and will likely result in a berm break with high losses to the public and infrastructure.

Make budget adjustments as per recommendations above:

- This alternative would enable staff to proceed with the emergency construction required immediately to address the compromised leaking berm area.

Staff recommend Alternative 2, to increase the budget by a gross amount of $2,500,000 for the emergency construction repair works for the Decew WTP Lower Reservoir Berm Repair.

Relationship to Council Strategic Priorities

This recommendation is related to the Responsible Growth and Infrastructure Planning, Objective 3.3: Maintaining Existing Infrastructure. Based on recent site investigations and consultant recommendations, immediate repairs of the DeCew berm and spillway area is required for investment in the infrastructure needed to provide clean drinking water and to protect public safety, property, environment and cultural-built heritage.

Other Pertinent Reports

None

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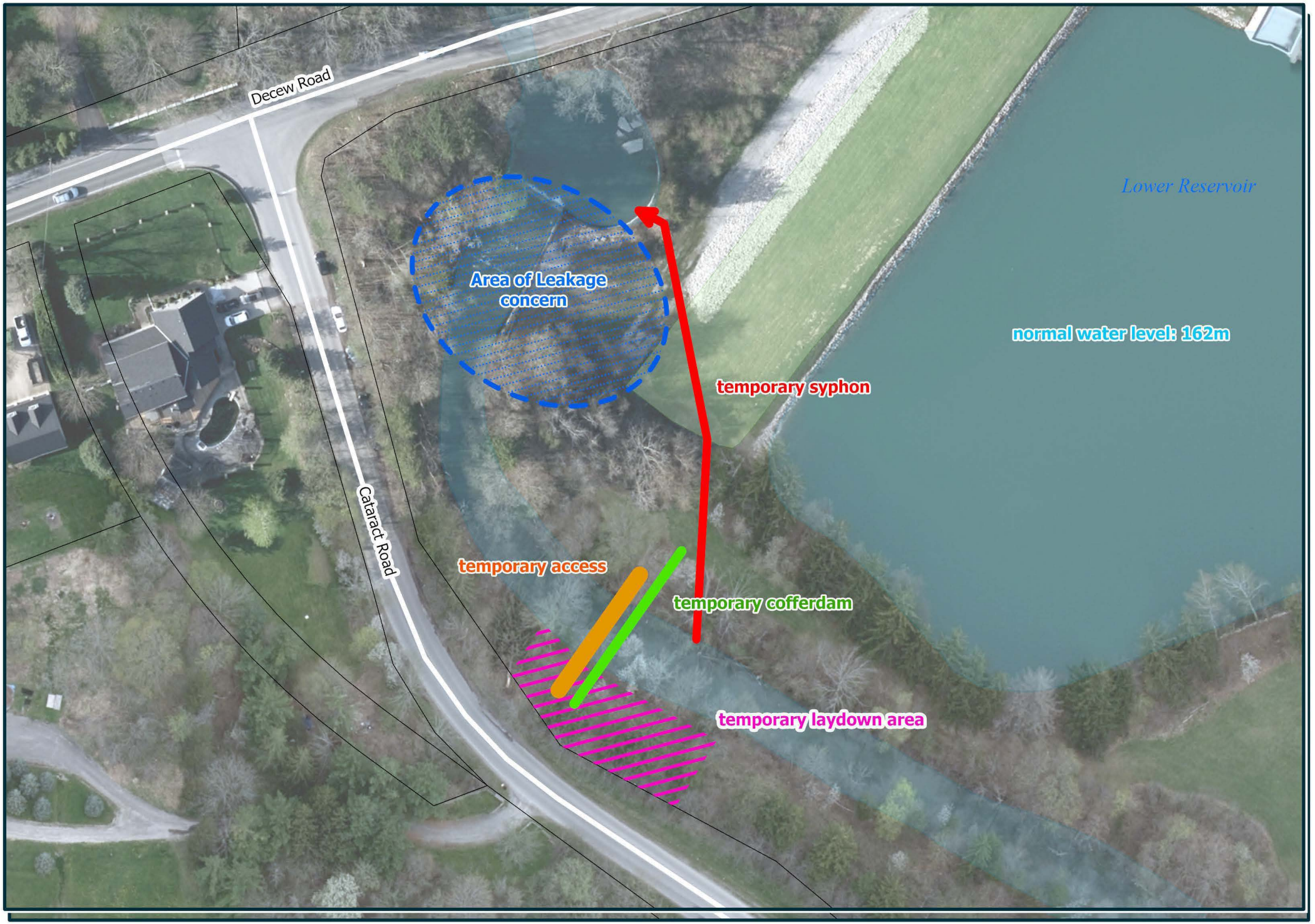
Appendices

Appendix 1	Decew Lower Reservoir Berm Repair
Appendix 2	Decew Lower Reservoir Berm Repair – Phase 1 Repairs
Appendix 3	Total Estimated Project Cost

Niagara Region

DeCew Lower Reservoir Berm Repair

Decew Lower Reservoir Berm Repair Phase I - Repairs



PW 29-2023 Appendix 3

Decew WTP Lower Reservoir Dam Repair - Total Estimated Project Cost - Contract Award

Total Estimated Project Cost (20001380)*	**Council Approved Budget**	**Budget Increase/ Reallocation**	**Revised Council Approved Budget**	**Expended & Committed as of 06/09/23**	**Contract Award/ Forecast**	**Budget Remaining**
Project Element	**(A)**	**(B)**	**(C) = (A) + (B)**	**(D)**	**(E)**	**(F) = (C)-(D)-(E)**
(a) Construction (including Construction Contigency and 1.76% non-refundable HST)**	420,000	2,000,000	2,420,000	6,106	2,698,478	(284,584)
(b) Project Contingency	60,000	-	60,000	-	60,000	-
(c) Consulting Engineering Services	-	-	-	-	-	-
i. Detailed Design	-	500,000	500,000	215,416	-	284,584
ii. Contract Administration & Inspection	-	-	-	-	-	-
iii. Geotechnical Service-Quality Control	-	-	-	-	-	-
(d) Project Management (In-House) and Operations	20,000	-	20,000	9,332	10,668	-
(e) Warranty	-	-	-	-	-	-
(f) Miscellaneous	-	-	-	-	-	-
Total Estimated Project Cost	**500,000**	**2,500,000**	**3,000,000**	**230,854**	**2,769,146**	**-**

Project Funding Sources

Regional Reserves and Debt	(500,000)	-	(500,000)	(500,000)	-	-
Capital Variance Project - Water	-	(2,500,000)	(2,500,000)	-	(2,500,000)	-
Total Project Funding Sources	**(500,000)**	**(2,500,000)**	**(3,000,000)**	**(500,000)**	**(2,500,000)**	**-**

*All costs include 1.76% non-refundable HST