

Expanded Uses of Hawrelak Park Lake

Recommendation

That the March 3, 2021, Integrated Infrastructure Services report CR_8015, be received for information.

Previous Council/Committee Action

At the January 29, 2020, Community and Public Services Committee meeting, the following motion was passed:

That Administration conduct a study on the expanded use of Hawrelak Park Lake, including an in-depth study of the current water quality of the lake, and provide a report outlining the results, the options and updated costs for each option.

Executive Summary

This report provides the results of the feasibility study completed on improving water quality at Hawrelak Park Lake. The root causes identified include waterfowl, lake sediment, surface runoff, river filling, and fertilizer, leading to high phosphorus levels that contribute to poor water quality. An ecological and holistic approach to manage the root causes impacting water quality standards could provide potential expanded use of the lake. These approaches include “on the water activities” (limited water contact) such as paddle boarding and kayaking and a water source for irrigation that would meet legislative requirements.

Report

Since the park opened in 1967, Hawrelak Lake has provided Edmontonians with opportunities to experience nature in the heart of our city. Administration has explored the possibilities for its expanded use since the International Triathlon Union (ITU), now World Triathlon, was first hosted in 2001. Opportunities explored in response to previous Committee motions included the process to create a permanent beach on the lake in Hawrelak Park and the actions required to make the lake more swimmable, presented at Community Services Committee on October 17, 2011 (2011CSR023). These investigations resulted in the proposed water play feature, presented to Community Services Committee on June 11, 2013 (CR_94) and subsequently brought forward for Council’s consideration in the 2019-2022 Capital Budget.

Managing Water Quality

The management of water quality in Hawrelak Lake has evolved. Several studies have been undertaken to understand how to best manage water quality, particularly in preparing the lake for World Triathlon events and to support necessary upgrades to the irrigation system which relies on the lake as a water source. Previous solutions have been directed at poor water quality symptoms and neglected to address the root causes.

The most recent water quality feasibility study was undertaken in 2020 as part of the William Hawrelak Park Rehabilitation project. The study takes a holistic and ecologically-based approach to manage water quality. This study addresses the root causes of the issue, bringing clarity to the lake's expanded uses that can be contemplated. Options for user experiences or use of the lake include:

- “by the water” (no water contact) such as walking, picnicking, bird watching around the lake;
- “on the water” (limited water contact) such as paddle boarding and kayaking; and
- “in the water” (direct water contact) such as wading or swimming.

Understanding the Lake Setting

Hawrelak Lake is an artificial water body that was designed to manage stormwater for the park. Its drainage basin area consists primarily of managed turf with all underground stormwater systems discharging to the North Saskatchewan River. It is a shallow lake, 1.5 metres in the deepest parts. The lake is susceptible to excessive algae growth due to the lack of a deep cold layer of water and shallow warm layer. There is little connection to groundwater due to the clay liner and depth of the aquifer. Man made lakes tend to accumulate sediments and nutrients at a faster rate than natural lakes.

Understanding the Lake Ecology

By sampling sediment, water and soil, the root causes of the poor water quality were analyzed, showing high phosphorus levels identified as the primary contributor. Phosphorus is an essential element for plant life and critical for a healthy water body. However, too much phosphorus increases the reduction of dissolved oxygen, causing excessive growth of algae, including blue-green algae.

Five significant phosphorus input sources were identified and are detailed in the table below.

Total Annual Phosphorus Loading Sources in William Hawrelak Park Lake

Total Phosphorus Source	Total Phosphorus Load (kg)
Waterfowl	15.83 kg
Sediment Release	7.39 kg
Surface Runoff	1.59 kg
River Filling	1.44 kg
Fertilizer Runoff	0.01 kg

Two primary sources, waterfowl (geese) and lake sediment release, far exceed other sources. Waterfowl droppings directly into the lake in addition to phosphorus release from the bottom sediment account for 88% of the phosphorus loading in the lake. The surface land runoff, filling the lake with river water and fertilizer runoff are minor contributors in comparison.

Geese droppings add phosphorus and nitrogen to the land around the lakes and directly into the lakes where they graze and loaf. Contributors to lake sediment are waterfowl droppings and feathers, algae that die and fall to the lake bottom, and sediment pumped into the lake from the river. When phosphorus containing sediment freezes in winter, the lower oxygen levels in the sediment lead to dissolved phosphorus production. When the ice melts, the phosphorus is mixed by wind and currents with the rest of the lake water, resulting in lake wide high total phosphorus concentrations until the phosphorus is consumed by plants and algae or becomes attached to bottom sediment.

Best Management Practices

Industry standard and best management practices were identified to address each of the five primary sources of high phosphorus levels. These measures will significantly impact phosphorus level reduction; however, geese will continue to contribute phosphorus into the future. Canada Geese are protected under the *Migratory Birds Convention Act* and interventions with geese populations are controlled federally. As such, there is a limit to the water quality standard that can be achieved. The recommended best management practices and associated costs to support improved water quality are detailed in Attachment 1.

Expanded Use of the Lake

Benefits of the implementation of the recommended measures include:

- improving the user experience “by the lake” through environmentally inviting spaces;

- the potential to achieve “on the lake” with limited water contact activities such as stand-up paddleboarding and kayaking added to current services in the park;
- enhancing the park’s sustainable irrigation strategy by providing an improved and consistent water supply from the lake; and
- providing an opportunity for adoption of a more sustainable and ecological approach to temporarily achieve “in the water” quality standards for the World Triathlon swim event.

Implementation of the recommended measures does not include “in the water” experiences such as wading and swimming due to the limitation to water quality standards that can be achieved through the best management practices.

The holistic and integrated approach to achieve water quality improvements for “by the lake” and “on the lake” is estimated at approximately \$2 million in capital costs and \$100,000 for ongoing yearly maintenance costs.

Next Steps

The William Hawrelak Park Rehabilitation Project is in the Develop Phase, with design development currently underway and planned to be complete in Q2 2022.

The recommended best management practices will be further defined through the forthcoming design development phase and will be included as part of the park’s growth considerations that are currently unfunded. Improving water quality to provide expanded uses of the lake will require public engagement to be completed in Spring 2021.

Operational impacts of implementing the recommended practices will be further assessed through design to support current function of the lake. These impacts are expected to include lake dredging every 8-15 years and staff resources to:

- Implement goose management and monitoring practices;
- Complete legislated water quality testing associated with the expanded use;
- Manage the park’s irrigation in alignment with code requirements; and
- Manage new planting around the lake.

Implementation of the proposed measures will improve the lake’s water quality and allow the City to continue delivering excellent services to the community and achieve the service objective of protecting Edmonton's natural environment while minimizing environmental impact.

Budget/Financial

Council has approved \$43.2 million of funding in 2019-22 within budget profile CM-32-0000 Open Space: Parks - Renewal. This profile provides funding for citywide

park infrastructure renewal, including the William Hawrelak Park Rehabilitation Project funded to Checkpoint 3 in the 2019-2022 Capital Budget Cycle.

The Develop phase of the project will be completed within the 2019-2022 Capital Budget Cycle and the Delivery phase is intended to advance for City Council's consideration as part of the 2023-2026 Capital Budget. This will include a funding request to support growth elements currently unfunded including the implementation of the proposed best management practices identified and the associated operational impacts of capital.

Corporate Outcomes and Performance Management

Corporate Outcome(s): Edmontonians use facilities and services that promote healthy living.			
Outcome(s)	Measure(s)	Result(s)	Target(s)
Edmontonians use facilities and services that promote healthy living.	City Park Usage (percent of survey respondents who report using a City park in the past 12 months)	89% (2017)	83% (2018)

Attachments

1. Recommended Best Management Practices and Cost to Support Improved Water Quality

Others Reviewing this Report

- M. Persson, Chief Financial Officer and Deputy City Manager, Financial and Corporate Services
- C. Owen, Deputy City Manager, Communications and Engagement
- R. Smyth, Deputy City Manager, Citizen Services
- B. Andriachuk, City Solicitor, Office of the City Manager