

EDMONTON WATER TREATMENT PLANTS FLOOD MITIGATION PROJECT

Recommendation

That Utility Committee recommend to City Council:

1. That the Edmonton Water Treatment Plants Flood Mitigation Barriers - Site Location Study and Environmental Impact Assessment, as outlined in Attachments 1 and 2 of the September 5, 2023, Utility Committee report UPE01896, be approved.
2. That the location of the flood mitigation barriers within the River Valley as outlined in Attachment 1 of the September 5, 2023, Utility Committee report UPE01896 be deemed essential, pursuant to Bylaw 7188 *North Saskatchewan River Valley Area Redevelopment Plan*.

Requested Action	Council Decision Required		
ConnectEdmonton's Guiding Principle	ConnectEdmonton Strategic Goals		
CONNECTED This unifies our work to achieve our strategic goals.	Climate Resilience		
City Plan Values	LIVE. THRIVE. PRESERVE.		
City Plan Big City Move(s)	Greener as we Grow	Relationship to Council's Strategic Priorities	Climate Adaptation and Energy Transition Conditions for Service Success
Corporate Business Plan	Serving Edmontonians		
Council Policy, Program or Project Relationships	<ul style="list-style-type: none"> • Bylaw 7188 - North Saskatchewan River Valley Area Redevelopment Plan • City of Edmonton Climate Change Adaptation Strategy and Action Plan 		
Related Council Discussions	<ul style="list-style-type: none"> • n/a 		

EDMONTON WATER TREATMENT PLANTS FLOOD MITIGATION PROJECT

Executive Summary

- The E.L. Smith and Rossdale Water Treatment Plants (WTPs), both owned and operated by EPCOR, fall within the boundaries of Bylaw 7188 - the *North Saskatchewan River Valley Area Redevelopment Plan*. EPCOR initiated an Edmonton WTP Flood Mitigation Project (the Project) to mitigate damage to the WTPs from flooding during a major flood event, with flood barriers to protect equipment and storage facilities that cannot be moved .
- The two main goals of this work are to limit potential damage to the facilities, and to ensure water treatment can resume as quickly as possible after a major flood event.
- A Site Location Study (Attachment 1) and Environmental Impact Assessment (Attachment 2) were received by Administration, as per the *North Saskatchewan River Valley Area Redevelopment Plan* requirements.
- EPCOR heard from community members who are concerned about the potential impact of a major flood on local homes, businesses and essential services. EPCOR confirmed that this project will not negatively affect the surrounding communities.
- As the Project will result in disturbance to the ground and vegetation, and considering the Indigenous heritage of these sites, EPCOR supported Indigenous monitoring, consulted with Indigenous Nations, and engaged in ceremony as part of the initial phases of the project. EPCOR committed to incorporating proper ceremony, monitoring and mitigating impacts throughout the project term.
- EPCOR sought input on flood barriers and design considerations at the Refine level on EPCOR's public engagement framework, which is similar to the City's public engagement framework.

REPORT

The Rossdale and E.L. Smith WTPs, both operated by EPCOR, provide drinking water to Edmonton and more than 90 surrounding communities – serving 1.4 million people.

Through the next 30 years, climate change modeling predicts that extreme weather will be more frequent.¹ For the North Saskatchewan River, this is expected to lead to higher flows in the winter and spring, with earlier or multiple spring runoff periods, and lower flows during the summer and fall.

Both of EPCOR's water treatment plants in Edmonton are situated in the North Saskatchewan River floodplain. These plants are critical infrastructure that are vulnerable to overland flood damage from the adjacent North Saskatchewan River as identified by EPCOR's insurance provider, FM Global. The insurer produced risk reports for both WTPs that assessed the sites' vulnerability to flood damage and made recommendations for protection. Flood risk is quantified in terms of "return periods", or the estimated probability of extreme events. Those recommendations, along with consideration of provincial guidelines, indicating that critical infrastructure be protected in the range from 1-in-500-year to 1-in-1000-year return period (0.2 per cent to 0.1 per cent year-over-year probability) be considered, and permanent flood

¹ See Chapter 3 in Edmonton's *Climate Resilient Edmonton: Adaptation Strategy and Action Plan* (2018), for a discussion on scientific projections of potential climate change impacts in the Edmonton region.

EDMONTON WATER TREATMENT PLANTS FLOOD MITIGATION PROJECT

mitigations at the WTPs be designed to a 1-in-500-year water level, plus an additional 1.0 metre of freeboard (contingency). The year-over-year probability of a 1-in-500-year return period is equivalent to an 18 per cent chance of occurrence over the design life of the flood barrier assets. In Alberta, the design flood used for flood hazard mapping is the 1-in-100 year return period flood. Typically, the 1:100 year flood maps are used for land use planning and help build resilient communities.

The potential for a flood to impact EPCOR's ability to provide clean drinking water, as well as direct costs to EPCOR and impacts to the region's gross domestic product, is significant. During a one-in-180-year flood event, river flood water would damage critical electrical infrastructure, chemical storage facilities and reservoirs. Without mitigation plans, the WTPs would remain inoperable for up to 10 months, with severely reduced or zero capacity in the early period (three to six months). It would be necessary for EPCOR to truck water to its Edmonton and regional customers. A boil water advisory would remain in place until the entire Edmonton and area water distribution and transmission network could be flushed and disinfected.

Project Overview

The goal of the Edmonton WTP Flood Mitigation Project is to manage the risk associated with flooding and ensure that customers receive drinking water service as soon as possible after a flood event.

The Project will protect the WTPs during a major flood event by:

- Developing flood barriers to protect from inundation and severe damage of water treatment equipment such as transformers and pumps, and from damage or contamination of below-grade treated water reservoirs at both sites. Locations of the proposed flood barriers are shown in Attachment 3.
- Preventing river water from backing up into the plants through drainage pipes that discharge to the river.
- Increasing protection to critical assets, or relocating them to higher ground within the water treatment plants.

Construction on the flood barriers is anticipated to begin in 2024, and grant funding is conditional on this timeline. EPCOR will continue to engage with community members and Indigenous nations and communities throughout the project.

Project Funding

The Project has three funding sources:

- The Government of Canada's Disaster Mitigation and Adaptation Fund (DMAF), which is providing approximately \$6 million.
- Alberta's Community Resilience Program, which is providing approximately \$16 million
- Water rates in Edmonton and surrounding regions during the 2022–2026 rate period, as previously approved at the August 30, 2021, City Council meeting, through Bylaw 19626 - EPCOR Water Services Bylaw.

EDMONTON WATER TREATMENT PLANTS FLOOD MITIGATION PROJECT

For EPCOR to receive funding from the Government of Canada and the Government of Alberta, and thereby reduce the burden on water rate-payers, EPCOR must start construction in 2024.

Summary of a Site Location Study (SLS)

The existing WTP critical infrastructure to be protected by the Project is located within the *North Saskatchewan River Valley Area Redevelopment Plan* boundary. The SLS determined that there are no reasonable scenarios where overland flood mitigation structures could be located anywhere other than directly proximate to the existing WTP sites and that the Project is dependent on the North Saskatchewan River Valley location.

The SLS examined the opportunities and constraints associated with implementing the Project versus maintaining the status quo (no flood protection of critical infrastructure). An option to relocate the Project within EPCOR-owned lands was also considered, but deemed unfeasible as this would directly impact existing structures within the fence line and disrupt water supply. The Project aligns directly with the City of Edmonton's Climate Change Adaptation Strategy and Action Plan, which includes an action item (Goal 6 & Action 11) to enhance long-term source water security and protection planning for water quantity and quality.

The implementation of the Project will result in some adverse residual environmental effects (i.e., the effects remaining after the implementation of mitigation measures) including changes to vegetation, wildlife habitat, and wildlife movement. These effects were reduced by Project design considerations including siting the majority of the flood mitigation structures on land that is already disturbed. Mitigation options were somewhat constrained by the United States Army Corps of Engineers (2000) design requirements² (the standard required by EPCOR's insurers, and used across North America) to maintain a root-free zone surrounding the flood mitigation structures. The Site Location Study determined the financial, social, environmental, and institutional constraints of the Project are outweighed by the benefits of increasing the resiliency of critical infrastructure in the context of riverine flooding.

Summary of the Municipal Environmental Impact Assessment (EIA)

Bylaw 7188 requires a Municipal Environmental Impact Assessment (EIA) be prepared, to outline potential impacts and identify ways to eliminate, minimize, or mitigate them through project design. The EIA identified Project-related interactions with the following valued components:

- Surface water and hydrology
- Geology, geomorphology, and soils
- Vegetation species and communities
- Wildlife and wildlife habitat
- Viewscape
- Historical resources

Residual effects associated with Project construction and operation at E.L. Smith and Rossdale are mostly limited to minor magnitude changes to vegetation, wildlife habitat, and wildlife movement. These effects were reduced by Project design considerations including siting the

² *United States Army Corps of Engineers*. 2000. Engineering and Design – Design for Construction of Levees. EM-1110-2-1913.

EDMONTON WATER TREATMENT PLANTS FLOOD MITIGATION PROJECT

majority of the flood mitigation structures on land that is already disturbed, and walls were used instead of embankments in more sensitive habitat locations. Compared to embankments, walls have a narrower footprint and result in less vegetation clearing. However, walls have a higher potential for erosion as well as a potentially larger visual impact. As a result, the use of both techniques is balanced throughout the site, depending on specific needs and risks.

Trees will need to be removed during construction. After construction a root-free maintenance zone will be established, which restricts the ability to replant these areas. This will result in a change in vegetation cover that adversely affects terrestrial wildlife movement in the existing corridor between the structures and the North Saskatchewan River. This impact will be partially mitigated in the near term by establishing vegetation enhancement plantings in the area between the river and the E.L. Smith WTP. In addition, the development and implementation of a long-term Vegetation Management Plan on EPCOR facility grounds will further mitigate the impacts of this work.

EPCOR anticipates the removal of a combined total of 557 trees. Of these, 77 are greater than 25 cm dbh³, 220 are between 10-25 cm dbh, and 260 are saplings (less than 10 cm dbh). A detailed breakdown of the tree impacts is available in Appendix D of the Environmental Impact Assessment (Attachment 2) which includes tables, maps, and sample photographs. The areas within the treatment plant sites targeted for naturalization over the long term under the Vegetation Management Plan will be greater in size than the areas removed to construct the barriers.

Construction activities will require ground disturbance and soil handling, which will result in the potential for sedimentation and erosion. Standard practices and the implementation of an Erosion and Sediment Control plan and Stormwater Management Plan are anticipated to adequately address this effect. Minor adverse impacts with respect to sedimentation and erosion are anticipated during the construction phase.

Vegetation Management Plan

To minimize and offset the impact of EPCOR's activity on vegetation and wildlife and improve the overall ecological structure and function at the water treatment plant sites, EPCOR is developing a long-term Vegetation Management Plan. The goal of the plan is to naturalize with vegetation areas larger in size than what is removed for the construction of the barriers.

This may include:

- Wildflower/ pollinator gardens
- Developing a diverse undergrowth and forest succession strategy around already treed areas
- Planting more trees to support citywide urban forest goals

EPCOR is also looking for opportunities to work collaboratively with Administration to align vegetation and habitat management outside the WTP fence lines.

As part of developing the Vegetation Management Plan, EPCOR requested participation from interested Indigenous communities to form a Traditional Ecological Knowledge working group to

³ Diameter at breast height (dbh), is the standard for measuring trees.

EDMONTON WATER TREATMENT PLANTS FLOOD MITIGATION PROJECT

provide meaningful input to vegetation management at the two WTP sites. In the first half of 2023, EPCOR held several meetings to walk the sites and discuss shared values, naturalization strategies, and gather feedback to ensure these lands were cared for appropriately.

Now that this knowledge has been shared, EPCOR will begin the work of ensuring the various needs for water treatment asset operations and maintenance are considered alongside this advice. More information on the planning process for the Vegetation Management Plan is in Attachment 4.

Legal Implications

Section 3.5.3 of Bylaw 7188 requires City Council to approve the attached Site Location Study (Attachment 1) before the Project can proceed.

In addition, Section 3.5.3 of Bylaw 7188 requires that City Council approve the Environmental Impact Assessment (Attachment 2), and that the location of the proposed barriers within the River Valley be deemed essential by City Council before the Project can proceed.

Community Insight

In May 2021, EPCOR initiated Indigenous and public engagement to understand how to best integrate the required flood barriers into certain locations around the plants. The following provides an overview of the engagement activities and outcomes.

Indigenous Engagement Process

The WTPs are situated on land with archaeological and historical significance. EPCOR engaged 32 Indigenous communities with an interest in these lands and so far, 28 Indigenous communities have participated in some way. EPCOR will continue these conversations throughout this project.

Feedback and responses were gathered from community representatives during three pipe ceremonies; several in-person walking tour days plus individually scheduled site visits; four virtual information sharing and guidance-seeking workshops; a hybrid (online and in person) event; Indigenous monitoring during ground disturbance work; and one-on-one conversations. A summary of feedback is included in Attachment 5.

The following themes and ideas emerged through Indigenous engagement:

- The importance of water
- Consideration for the environment, tree removal, replanting
- Allow for interaction with the land, maintain harvesting opportunities
- Many histories and stories of the areas
- Employment opportunities for Indigenous people through this project

EPCOR is committed to creating employment opportunities through monitoring archeological work. In addition, EPCOR has committed to provide Indigenous businesses with equitable opportunities in procurement by developing and implementing an Indigenous procurement strategy, with input from Indigenous communities. EPCOR is a member of the Canadian Council for Aboriginal Business' (CCAB) Procurement Champions Group. EPCOR also notes the historical significance of the nearby Rosedale Burial Ground, and third-party hydraulic modeling has

EDMONTON WATER TREATMENT PLANTS FLOOD MITIGATION PROJECT

concluded that the Rossdale Burial Ground site would not be reached by river flooding in a 1-in-500-year return period flood. The Project would also not encroach on the Rossdale Burial Ground Site.

Community Engagement Process

EPCOR conducted three phases of community engagement by seeking community members' input to help improve the quality of the project design. A key commitment of EPCOR's plan to protect the WTPs is that any flood barriers will not worsen flooding in surrounding neighbourhoods.

Hydraulic modeling from the provincial government, based on work by the United States Army Corps of Engineers and confirmed by a third-party consultant, shows that there would be no change in the water level across the floodplain around Rossdale due to the WTP flood barriers. In addition, flood flows through the community would not be worse due to the presence of flood barriers around the plant. Additional information on the Rossdale community consultation is available in Attachment 6. Neighbourhoods around the E.L. Smith WTP exist above the floodplain.

EPCOR has programs in place to help communities and homeowners in the flood plains mitigate other impacts of both rainfall and river-related flooding:

- The Stormwater Integrated Resource Plan is a 20 year, \$1.6 billion plan that includes a variety of actions to slow, move, secure, predict and respond to flooding in Edmonton neighbourhoods. In Rossdale, EPCOR is proposing construction of a dry pond, improvements to the outfall gates to prevent water backup, and low-impact development (or "green infrastructure").
- EPCOR's Homeowner Flood Prevention Program includes free flood-proofing home inspections, as well as a backwater valve subsidy for eligible properties. EPCOR advertised free Wi-Fi water sensors to 922 homes in the Rossdale and Riverdale communities this past summer, and distributed 31 sensors to those interested.
- In the event of a severe flood from the river overtopping its banks, the City of Edmonton and Alberta Environment and Protected Areas would activate their Emergency Operations Centre. EPCOR would play a supporting role in the response and recovery efforts, and would seek to ensure drinking water remains available to help with these efforts.

EPCOR Engagement Results

A combination of grass-covered embankments and flood walls will be built around the WTPs. These barriers are designed to consider Indigenous and community input while meeting technical requirements, reducing the impacts to vegetation and wildlife, and minimizing the cost to rate-payers.

Through Indigenous and community engagement, EPCOR identified key design considerations for the barriers at each plant. These design considerations, which EPCOR will take forward to detailed design in 2023, include the following.

Rossdale:

- Create space for recreation and active transportation

EDMONTON WATER TREATMENT PLANTS FLOOD MITIGATION PROJECT

- Blend into existing surroundings
- Consider how to discourage vandalism
- Improve “institutional” look/feel of the WTP (e.g., avoiding red brick, which may be reminiscent of residential schools)
- Celebrate the history of the area
- Add amenities that support recreation and community gathering

E.L. Smith:

- Prioritize maintaining and enhancing existing environment
- Support existing recreational use and ensure that any new amenities do not conflict with recreational use
- Include educational features with Indigenous representation

Additional consultation information is available in the What We Heard Report, Attachment 7.

GBA+

EPCOR did not complete a GBA+ assessment for this project. Indigenous and public engagement was conducted under the International Association for Public Participation (IAP2) framework. Landscape architecture has and will continue to take Crime Prevention Through Environmental Design (CPTED) principles into consideration.

Attachments

1. Site Location Study for EPCOR WTP Flood Mitigation Barriers
2. Environmental Impact Assessment for EPCOR WTP Flood Mitigation Barriers
3. Proposed Flood Barrier Maps
4. Vegetation Management Plan Planning Process Overview
5. Phase 2 Indigenous Engagement Update
6. Rosedale Partners in Flood Resilience Engagement Summary Report
7. Phase 2 Community What We Heard Report