



**EPCOR WTP Flood Mitigation
Barriers Site Location Study,
Edmonton, Alberta**

February 23, 2023

Prepared for:

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EPCOR WTP FLOOD MITIGATION BARRIERS SITE LOCATION STUDY, EDMONTON, ALBERTA

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Introduction
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1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by EPCOR Water Services Inc. (EPCOR) to complete a Site Location Study (SLS) for the Flood Mitigation Embankments project at the E.L. Smith and Rosedale Water Treatment Plants (WTPs) (the Project) (Figure 1-1). The Project will include the construction of flood mitigation works designed to mitigate the risk of overland flooding up to a 1:500-year event. The Project is needed to protect critical infrastructure that provides drinking water to the City of Edmonton and more than 65 surrounding communities and counties, amounting to more than 1.3 million people.

A portion of the planned flood mitigation works and associated infrastructure at both the E.L. Smith and Rosedale WTPs would occur on land owned by the City of Edmonton (COE), and within the *North Saskatchewan River Valley Area Redevelopment Plan* boundaries (Bylaw 7188).

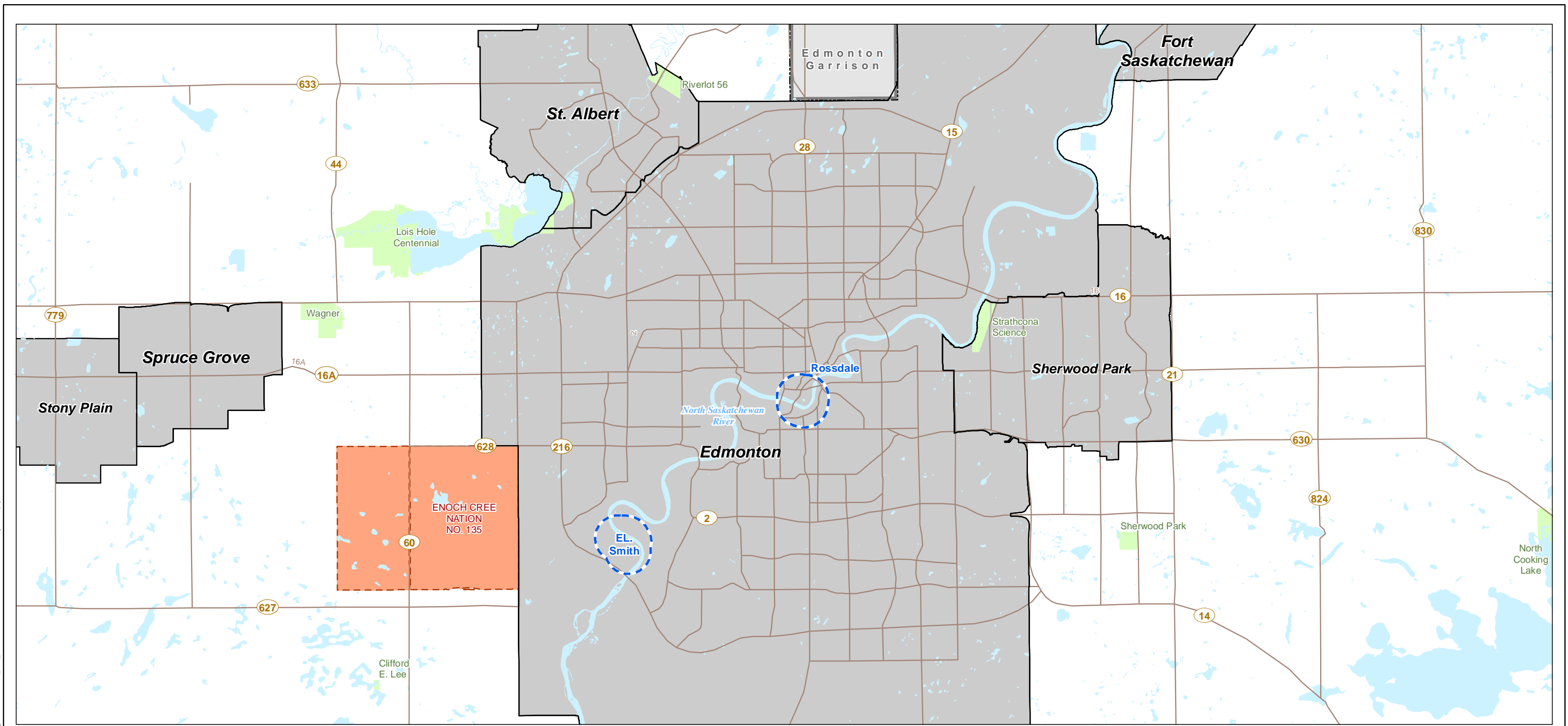
The scope of this SLS, as laid out in the SLS Terms of Reference (SLS TOR) is to examine the financial, social, environmental, and institutional opportunities and constraints associated with the development of the Project to aid the City of Edmonton's determination of the Project as essential to occur at the proposed locations. Given that the Project is the development of overland flood mitigation structures surrounding existing critical infrastructure (the WTPs), the Project cannot be physically re-sited outside of the North Saskatchewan River Valley Area Redevelopment Plan boundary. There are no reasonable scenarios where overland flood mitigation structures could be located anywhere else than directly proximate to the existing WTP sites. The Project is dependent on the North Saskatchewan River (NSR) valley location.

Therefore, the questions posed in the Opportunities and Constraints Analysis section of the SLS TOR regarding constraints that limit the feasibility of locating the Project outside of the NSR valley are limited to three scenarios, as follows:

1. The Project is built as proposed
2. The Project is built entirely on EPCOR-owned land
3. The Project is not built

This document is a companion document to the Municipal Environmental Impact Assessment that will be submitted under a separate cover. Together these documents have been completed to meet the requirements of Bylaw 7188.

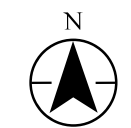
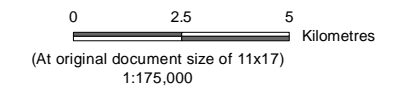




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- Local Assessment Area
- Road
- Aboriginal Reserve
- Military Base
- Park or Protected Area
- Urban Area
- Waterbody



<i>Project Location</i> Edmonton Alberta	Prepared by DS on 2022-10-05 TR by SM on 2022-10-05 IR Review by SJ on 2022-10-17
<i>Client/Project</i> EPCOR Water Services Inc. EPCOR WTP Flood Mitigation	110146440-005

Figure No.
1-1

Title
Project Overview

Notes
 1. Coordinate System: NAD 1983 3TM 114
 2. Data Sources:
 3. Background: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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1.1 BACKGROUND

EPCOR operates the E.L. Smith and Rossdale WTPs in the City of Edmonton. These plants collect and treat water from the NSR and provide safe drinking water to over a million Albertans.

Both WTPs are located on the lower terrace of the NSR valley and may be vulnerable to overland flooding. In the context of climate change, the risk of urban flood damage in Canadian cities is increasing (Henstra and Thistlewaite 2017). The elevated risk is attributable to changes in snowmelt runoff caused by increasing temperatures, and increased likelihood of intense rainfall and severe storms (White and Etkin 1997; Loukas and Quick 1999; Cunderlik and Simonovic 2005 as cited in Henstra and Thistlewaite 2017).

Due to major flooding across Alberta in 2013, EPCOR's insurance provider FM Global conducted an assessment of the Edmonton WTP's vulnerability to overland flooding from the NSR. Risk Reports were produced by FM Global for the E.L. Smith and Rossdale WTPs in 2017 and 2019 (FM Global, 2017a, 2017b; FM Global, 2019a, 2019b). The Risk Reports identified flood hazard concerns, site infrastructure requiring upgrades, and included recommendations for EPCOR to revise their Flood Emergency Response Plans.

To manage the impact of these factors on residential and commercial customers in Edmonton, EPCOR has developed the Stormwater Integrated Resource Plan (SIRP). SIRP 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. EPCOR evaluated the submersion risk to critical equipment and structural damage that could potentially result from a major NSR flood at both the Rossdale WTP and E.L. Smith WTPs and determined that flood mitigation measures were necessary at both WTPs. Stantec undertook design studies to determine the best course of action to address flood hazard concerns at both WTP sites.

1.2 SITE DESCRIPTION

1.2.1 E.L. Smith WTP

The E.L. Smith WTP is located at 3900 E.L. Smith Road NW, Edmonton Alberta, within SE 9-52-25 W4M and SW 10-52-25 W4M. The WTP is located on the floodplain of the NSR valley due to the necessity of locating a WTP adjacent to its water source.

1.2.2 Rossdale WTP

The Rossdale WTP is located at 9469 Rossdale Road NW, within SE 32-52-24 W4M. The WTP site is located on the floodplain of the NSR due to the necessity of locating a WTP adjacent to its water source.

1.3 PROJECT DESCRIPTION

The Project was designed to meet the following overarching objectives:

- Increase protection to critical assets or relocate them to higher ground within the water treatment plants.
- Prevent river water from backing up into the plants through drainage pipes that discharge to the river.
- Develop flood barriers to protect equipment and storage facilities that cannot be moved.



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EPCOR intends to protect the WTPs from overland flooding from the NSR through the construction of flood mitigation structures at both locations. Earthen embankments and concrete floodwalls were identified as the appropriate mitigation to reduce flood risk to the Edmonton WTPs.

The flood mitigation structures were designed to meet these specific objectives:

- Reduce the likelihood of damage to the WTPs during a NSR flood (1:500-year event)
- Mitigate the effects of flooding to allow EPCOR to resume potable water treatment as quickly as possible afterwards
- Protect and accommodate existing site infrastructure such as utilities, roads, swales, river valley trails, the kīsikāw pīsim solar farm, and the Rossdale WTP treated water reservoirs
- Reduce the potential for flood water from the river to flow into the plant sites via the existing drainage pathways such as the waste streams and stormwater system
- Retain, as much as possible, the natural landscape around the WTPs between the facility and the NSR

1.4 PROJECT ALTERNATIVES

1.4.1 Option 1 – Construct Project as Proposed

The Project, as proposed, will consist of the construction of earthen embankments, demountable barriers, and floodwalls around the existing WTP facilities at E.L. Smith and Rossdale (refer to Appendix A drawings). The Project is sited primarily on EPCOR-owned property. Only a small portion of the western most end of the E.L. Smith embankment will cross outside the bounds of EPCOR property. Portions of the embankment at the Rossdale lie partially or fully on land owned by COE. The Project also includes improvements to waste stream infrastructure and the stormwater management system at both locations.

1.4.2 Option 2 – Construct Project entirely within EPCOR-Owned Property

An alternative option to the Project, as proposed, would be to site the Project entirely within existing disturbance on EPCOR-owned lands exclusively. At both locations, there are existing buildings that abut the existing security fencing on the WTP site perimeters. These existing buildings would need to be removed and reconstructed in order to site the infrastructure within EPCOR-owned lands to USACE (2000) standards, potentially resulting in drinking water service outages and considerable costs to ratepayers.

At E.L. Smith utilizing a relatively small area of City land allows the flood infrastructure to tie into the topography of the valley wall (See Section 3.4). This prevents the need for a significant length of additional flood mitigation infrastructure to be constructed along the property line to protect against the design flood event. This option would bring extra cost both to the environment through additional disturbance, and financial costs for additional materials and construction effort.

Option 2 is not considered to be in the public interest due to the potential for service outages and costs passed on to ratepayers. Therefore, this option is not considered further.



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1.4.3 Option 3 – Status Quo – Do not Protect Critical Infrastructure against Potential Overland Flooding

The third alternative option to the proposed Project is not to build the Project at all. This option puts the public at risk of drinking water outages in the event of overland flood events. These two WTPs serve over a million Albertans, and flood events could result in the contamination of the existing reservoirs with untreated river water, chemical spills, extended periods of service outages for the public while systems are drained, cleaned, and reactivated. The emergency shutdown of a water treatment plant could result in clean water outages that could persist for months.

Further, EPCOR's insurance company (FM Global) has conducted an actuarial analysis of flood risk at both locations and recommended that flood mitigation infrastructure is implemented at both WTP sites to address a 1:500 year flood return level with an additional 1 metre of contingency freeboard incorporated into the Project's design of the floodwalls and earthen embankments.



2.0 LOCATION ANALYSIS AND JUSTIFICATION

The overall scope of the Project is to protect existing critical infrastructure from overland flooding at the two WTP locations within the Bylaw 7188 area.

The SLS TOR requires the following three questions to be addressed in this document:

1. What other locations were considered for this project including other river valley and non-river valley locations?
2. Could the proposed project reasonably function at a location outside of the North Saskatchewan River Valley Area Redevelopment Plan (Bylaw 7188) boundary?
3. Is the project dependent on either the river valley and ravine location or the users of the park system?

The existing critical infrastructure WTP to be protected by the Project occurs within the Bylaw 7188 boundary. There are no reasonable scenarios where overland flood mitigation structures could be located anywhere else than directly proximate to the existing WTP sites. The Project is dependent on the NSR valley location.

Project alternatives are limited to alternative in situ design concepts that achieve flood mitigation objectives, or not protecting critical infrastructure from future major flood events.



3.0 OPPORTUNITIES AND CONSTRAINTS ANALYSIS

The Project team considered engineering, environmental, and regulatory constraints in the design of a Project that is intended to balance the need to protect critical infrastructure and limit potential adverse effects to valued biophysical components and public enjoyment of the NSR valley.

3.1 FINANCIAL OPPORTUNITIES AND CONSTRAINTS

Constructing the Project in the proposed locations will cost less and maintain services in the event of a major overland flood event if the Project is built prior to flooding (Table 3-1), whereas the costs of not building the Project would be substantial if a flood event occurred.

Table 3-1 Financial Opportunities and Cost Constraints of Project Alternatives

Project Alternatives	Opportunities	Cost Constraints
Option 1: Project	<ul style="list-style-type: none"> • Protection from overland flooding and groundwater migration in the case of a 1:500 return-period probability high water event in the North Saskatchewan River is achieved. This is the option with the lowest impact to society and the Provincial economy in the event of a major flood in the North Saskatchewan River. Rather than taking out operations for months in the event of a major (1:500) flood, the WTPs would likely be operable within a much shorter timeframe. • Grant funding available from provincial and federal government programs. Full funding only available for the selected Project option (approx \$21 million) • EPCOR will incur annual insurance savings after completion of Project 	<ul style="list-style-type: none"> • Project implementation is estimated at approximately \$37 million.
Option 3: No Project (Status Quo)	<ul style="list-style-type: none"> • Project costs would be limited to money required for regulatory permitting and design costs (preliminary design) 	<ul style="list-style-type: none"> • The cost and damages to EPCOR of a 1:180 year flood is estimated at \$370 million, and the potential GDP impacts to the region are estimated at between \$28 billion to \$45 billion. • If left unmitigated, EPCOR could be faced with potentially higher insurance premiums, or having insurance revoked • Forgo provincial and federal grant funding • Direct cost to citizens including added electrical cost of boiling water, estimated to collectively cost \$13 million



Opportunities and Constraints Analysis
 February 23, 2023

Table 3-1 Financial Opportunities and Cost Constraints of Project Alternatives

Project Alternatives	Opportunities	Cost Constraints
		<ul style="list-style-type: none"> • EPCOR would incur costs due to: <ul style="list-style-type: none"> – trucking in water for the public, hospitals, correctional facilities – damage and lost revenue due to damage to critical electrical infrastructure, chemical storage facilities and reservoirs – Cleaning and disinfection of the reservoirs and regional drinking water treatment network – Loss of revenue from lost water sales

3.2 SOCIAL OPPORTUNITIES AND CONSTRAINTS

Table 3-2 details the social opportunities and constraints of the two Project alternatives.

Table 3-2 Social Opportunities and Constraints of Project Alternatives

Project Alternatives	Opportunities	Constraints
Option 1: Project	<ul style="list-style-type: none"> • Maintain safe drinking water to communities and essential services in the event of major flood event • Allow First Responders to focus on assisting the community in the event of a major flood event • Constructing the Project will contribute to GDP and local economy (i.e., materials, labour, jobs) • Detailed design and other professional services will contribute to the GDP • Project amenities: opportunity for Indigenous art and interpretation to provide culturally relevant local information • Inclusion of community and Indigenous input to Project amenities and design features • Potential for Indigenous community inclusion across a spectrum of Project activities: art work, input into vegetation management, input on chance finds during ground disturbance, and employment opportunities. 	<ul style="list-style-type: none"> • Disruption of trail use in NSR valley during construction • Noise and dust during construction affecting nearby neighbourhoods • Potential for ground disturbance to interact with historical resources during construction • Some may view some of the concrete flood walls to be detrimental to the natural aesthetic of the NSR valley and it may impact their enjoyment of the adjacent recreational spaces. • The Project may constrain the City’s options when planning uses for the space adjacent to Rossdale (e.g., proposed Touch the Water project)



Table 3-2 Social Opportunities and Constraints of Project Alternatives

Project Alternatives	Opportunities	Constraints
Option 3: No Project	<ul style="list-style-type: none"> • No Project-related change to trail use • No Project-related change to noise or dust 	<ul style="list-style-type: none"> • If major flood event occurs service outages of several months are possible <ul style="list-style-type: none"> – Boil water advisories or trucked water requirements are inconvenient • Potential for cascading effects due to lack of safe drinking water, such as effects to public safety (i.e., hospitals other essential services)

3.3 ENVIRONMENTAL OPPORTUNITIES AND CONSTRAINTS

At the E.L. Smith WTP, approximately 0.3 ha native vegetation composed of trees and shrubs will be lost and replaced with a native grass mix that will be maintained through mowing and weed control over the life of the Project. The native grass mix will be planted in the 4.6 m root free zones required in proximity to the earthen embankments and floodwalls. The root free zones are a design requirement per USACE (2000) standards and specifications to maintain the integrity of the structures.

The earthen embankments are positioned within existing disturbance within the E.L. Smith WTP fence line to the extent possible, and therefore SLS requirements do not apply to these sections. Design considerations resulted in the selection of floodwalls around the Low Lift Pumphouses rather than earthen embankments to reduce the Project’s footprint in native vegetation and maintain wildlife habitat in proximity to the NSR. The floodwall will be located within the WTP site in existing disturbance, where possible, with some small incursions on native vegetation where existing buildings preclude siting on existing disturbance.

At the Rossdale WTP, minor amounts of native vegetation communities will be lost or altered as a result of the Project implementation (<0.001 ha of Aspen Woodland Alliance). Some tree removal may be required in land units mapped as green space, residential, or industrial development. Following restoration and revegetation manicured grass will be replaced and maintained as native grass cover as required in the root-free zone required by USACE (2000) standards.

EPCOR has initiated the development of a vegetation management plan for areas within the fenceline of the WTPs. The objective of the plan is to improve the overall ecological structure and function within the sites through the restoration of habitat. Detailed mapping of current vegetation at each site is underway, as is long-term planning to increase the extent of natural areas within EPCOR-owned properties in the NSR valley. EPCOR is looking for opportunities to collaborate with the COE to align with the Urban Forest Management Plan on vegetation management outside the fencelines of this Project.

Overall, the adverse residual effects associated with the Project are mostly limited to minor magnitude changes to vegetation and wildlife habitat and wildlife movements. These effects were reduced by Project design considerations including siting the majority of the flood mitigation structures on existing



disturbance. The USACE (2000) requirements to maintain a root-free zone will result in some areas of treed or shrub habitat being maintained as a native grass cover in the long-term. This change in cover may adversely affect terrestrial wildlife movements in existing corridors between the structures and the NSR, depending on the species and time of year. Table 3-3 details the social opportunities and constraints of the two Project alternatives.

Table 3-3 Environmental Opportunities and Constraints of Project Alternatives

Project Alternatives	Opportunities	Constraints
Option 1: Project	<ul style="list-style-type: none"> • Replace manicured grass with native grass cover at Rossdale • Opportunity to collaborate with COE to offset native vegetation loss outside of EPCOR’s fenceline and on implementation of EPCOR’s Vegetation Management Plan with the objective of overall net gain in ecosystem structure and function through habitat restoration within the WTP sites 	<ul style="list-style-type: none"> • Replacement of small area (0.3 ha; <0.001 ha) native vegetation cover (trees and shrubs) with native grass cover at E.L. Smith and Rossdale, respectively • Change in cover may adversely affect wildlife movements in existing corridors during construction and in the long-term • Construction-related disturbance to wildlife
Option 3: No Project	<ul style="list-style-type: none"> • No Project-related change to vegetation • No Project-related change to wildlife movements 	<ul style="list-style-type: none"> • No change, therefore not applicable

3.4 INSTITUTIONAL OPPORTUNITIES AND CONSTRAINTS

The City of Edmonton has policies and bylaws that regulate and guide the construction of new facilities below the top-of-bank within the NSR Valley system. These policies are in place to protect Edmonton’s natural features from increasing development pressures. Policies that may apply to the Project include, but are not limited to Bylaw 7188, Edmonton City Plan Charter Bylaw 20,000, Policy C531, and the Ribbon of Green SW + NE Plan. Each of these is discussed below in relation to Project construction.

3.4.1 Bylaw 7188: North Saskatchewan River Valley and Area Redevelopment Plan

The Bylaw 7188 (City of Edmonton 1985) was developed to protect the NSR valley and ravine system as part of the City of Edmonton’s open space heritage. Bylaw 7188 envisions a major portion of the NSR valley and ravine system used as an environmental protection area. The major goal of Bylaw 7188 is to ensure preservation of the natural character and environment of the NSR valley and ravine system. Table 3-4 details how the Project meets the requirements of Bylaw 7188.



Table 3-4 Project Concordance with Bylaw 7188

Bylaw Section and Objective or Policy	Description	How does the Project meet the requirements of the Bylaw
2.4.2 Environmental Protection Objective	To consider environmental factors when planning for use in the NSR valley.	The Project went through preliminary design with objectives to reduce the impact of the Project on the environment in the NSR valley, including siting the Project to the extent practical on EPCOR-owned land.
3.2.1 Urban Design and Architectural Guidelines	It is the policy of this Plan that all public development will conform to Council approved environmental, urban, and architectural design guidelines to be developed in future studies and park development plans.	Preliminary design of the Project is informed by consultation with City of Edmonton, the public, neighbours, Indigenous partners, and others. The Project conforms to all design guidelines provided by the City of Edmonton
3.3.3 Application of Environmental Impact Assessment	It is the policy of this Plan to ensure the application of an environmental impact screening and assessment to all proposed public development and development on public land.	An EIA has been prepared for the proposed Project
3.5.3 Site Location Study and Environmental Impact Screening Assessment	It is a policy of this Plan that all proposals for the development of a major facility that is publicly owned or is developed on public lands shall be subject to an environmental impact screening assessment as outlined in Schedule D, and a detailed site location study detailing costs, and social, environmental, and institutional constraints which make a River Valley location essential must be prepared for Council approval.	An SLS has been prepared (this report) and an EIA has been prepared for the proposed Project.

3.4.2 Edmonton City Plan Charter Bylaw 20,000

The Edmonton City Plan (Charter Bylaw 20,000) is the City of Edmonton’s Municipal Development Plan and is designed to guide the City’s growth and development until 2040 (City of Edmonton 2020a). This bylaw includes objectives and policies that are relevant to the Project, as detailed in Table 3-5.



Table 3-5 Project Concordance with the Edmonton City Plan

Bylaw Section and Objective or Policy	Description	How does the Project meet the requirements of the Policy?
<p>1.4 Edmontonians demonstrate shared leadership as stewards of the environment.</p> <p>2.1 Edmontonians feel safe and secure in their communities and benefit from public spaces and infrastructure that support health and wellbeing.</p>	<p>1.4.2 Ensure Edmonton's air, land and water are safe and clean.</p> <p>1.4.2.1 Protect, restore, maintain and enhance a system of conserved natural areas within a functioning and interconnected ecological network.</p> <p>1.4.2.2 Partner to effectively manage, monitor and communicate air, land and water quality to protect human and ecosystem health.</p> <p>1.4.2.3 Expand and enhance a healthy and sustainable urban forest.</p> <p>2.1.1 Ensure that publicly accessible spaces and facilities are designed and maintained for the year-round safety, security and comfort of all users.</p>	<p>The Project was designed to limit effects to the surrounding habitats and wildlife corridor. There will be a reduction in native vegetation, comprised of the replacement of small area (0.3 ha; <0.001 ha) native vegetation cover (trees and shrubs) with native grass cover at E.L. Smith and Rosssdale, respectively.</p> <p>Project will manage water quality to protect human and ecosystem health.</p> <p>Change in cover may adversely affect wildlife movements in existing corridors during construction and in the long-term.</p> <p>The Project will temporarily affect multi-use trails during the construction period, trail availability will be returned to baseline after construction is complete.</p>
<p>2.4 Edmonton is a leader in efficient, sustainable and resilient community design, development and living</p>	<p>2.4.2 Ensure public buildings and infrastructure are sustainable and resilient.</p> <p>2.4.2.1 Manage the impacts of climate change on City assets in the design, maintenance and retrofit of buildings and infrastructure.</p>	<p>The WTPs are not public buildings, but the Project does seek to manage the impacts of climate change on infrastructure that serves the public. The implementation of the Project is essential to improving the resilience of critical infrastructure that serves 1/3 of the population of the Province of Alberta through the provision of safe drinking water.</p>
<p>5.1 Edmonton protects, expands and improves access to its natural systems and open spaces in support of biodiversity and the health and enjoyment of all Edmontonians.</p>	<p>5.1.1 Ensure protection, enhancement and opportunities for access to open space and the river valley and ravine system.</p> <p>5.1.2 Promote the conservation and restoration of natural systems to improve ecological connectivity and reduce habitat fragmentation</p>	<p>The preliminary design of the Project incorporated objectives to retain the natural landscape around the WTPs, and specifically between the facility and the NSR, as much as possible.</p> <p>Preliminary design of the Project included siting flood mitigation structures on existing disturbance within the WTP lands to the extent practical. Ecological design best practices were implemented in preliminary design, but were somewhat constrained by USACE (2000) design standards that require a root-free zone to be maintained on either side of the flood mitigation structures.</p> <p>The Project will temporarily affect multi-use trails during the construction period, trail availability will be returned to baseline in post-construction.</p> <p>The preliminary design of the Project incorporated objectives to retain the natural landscape around the WTPs, and specifically between the facility and the NSR, as much as possible.</p>



Table 3-5 Project Concordance with the Edmonton City Plan

Bylaw Section and Objective or Policy	Description	How does the Project meet the requirements of the Policy?
		<p>The Project will site mitigation structures on existing disturbance within the WTP lands to the extent practical. Ecological design best practices were implemented in preliminary design, but were somewhat constrained by USACE (2000) design standards that require a root-free zone to be maintained on either side of the flood mitigation structures.</p> <p>The Project will result in some changes to native vegetation. At E.L. Smith some tree/shrub community will be changed to native grass cover. At Rossdale, some manicured grass will be changed to native grass cover.</p>
<p>5.4 Edmonton’s natural and physical systems provide security and resilience against extreme weather events and other environmental hazards</p>	<p>5.4.1 Ensure the safety and security of Edmonton’s water supply, food systems, infrastructure and natural systems to support long-term resilience to flooding, droughts and extreme weather events.</p>	<p>The implementation of the Project will improve flood resilience by reducing the likelihood that overland flood would damage the WTPs or cause them to be inoperational.</p>
	<p>5.4.2 Ensure rapid support to Edmontonians in times of emergency, disaster and crisis</p> <p>5.4.2.2 Partner with regional partners, private and not for profit organizations to support Edmontonians during extreme weather conditions, emergencies, disasters and crisis.</p>	<p>The Project could be considered a partnership between EPCOR and COE to protect drinking water available to the public during a massive overland flooding event. By protecting the WTPs from overland flooding, emergency responders would be available to support community flood response. In addition, the availability of safe drinking water will enable faster recovery for the community in the event of a major flood event.</p>
<p>6.4 Edmonton uses its economic strength to foster innovation, lead new initiatives and strengthen its future prosperity.</p>	<p>6.4.2 Ensure Edmonton plans and implements climate change mitigation, adaptation and resilience.</p> <p>6.4.2.1 Align, implement and monitor climate change mitigation and adaptation planning to meet local, national, and international commitments.</p>	<p>The purpose of the Project is to increase resilience to climate change through mitigating the potential for overland flooding to adversely affect clean water supply. Economic prosperity is dependent on a resilient supply of safe drinking water</p>

3.4.3 Policy C531: Natural Area Systems

The Natural Area Systems Policy (City of Edmonton 2007) was developed to help conserve, protect, and restore the natural wetlands, uplands, water bodies, and riparian areas within the City of Edmonton to safeguard the City’s natural capital and associated ecological services. As per this policy, the City of Edmonton will demonstrate balance between ecological and environmental considerations with economic and social considerations in its decision making.

The main purposes of this policy that are relevant to the Project are discussed in Table 3-6.



Table 3-6 Project Concordance with Policy C531

Purpose of the Policy	How does the Project meet the purpose of the Policy?
Conserve, protect, and restore biodiversity throughout Edmonton recognizing the urban context that we work within	Preliminary design of the Project included siting flood mitigation structures on existing disturbance within the WTP lands and reducing the incursion on COE lands within the NSR valley to the extent practical. Preliminary designs were constrained by USACE (2000) design standards that require a root-free zone to be maintained on either side of the flood mitigation structures, and there are small habitat changes required to accommodate the Project that may reduce wildlife movement corridors depending on species and time of year.
Ensure consistent, uniform and equitable conservation practices that are based on the best available science; Direct Administration to: <ul style="list-style-type: none"> • plan our city so that our ecological systems will function effectively at neighbourhood, city and regional scales 	The Project was designed to reduce adverse effects to ecological systems in the NSR Valley. Disturbance to native vegetation has been reduced by siting the structures on existing disturbance where practical. This reduces impacts to vegetation and to the use of the areas between the WTPs and the NSR by wildlife species.
Conserve, protect, and restore natural area systems through the physical planning and development process; according to the provisions of municipal, provincial and federal policy and legislation;	The Project was designed to reduce adverse effects to ecological systems in the NSR Valley. Disturbance to native vegetation has been reduced by siting the structures on existing disturbance where practical. This reduces impacts to vegetation and to the use of the areas between the WTPs and the NSR by wildlife species. Mitigation outlined in the MEIA include measures to address the Project’s location within a Key Wildlife Biodiversity Zone (provincial), as well as measures to reduce the risk of inadvertent damage or destruction of the nests of migratory birds (federal).

3.4.4 Climate Resilient Edmonton: Adaptation Strategy and Action Plan

Climate Resilient Edmonton: Adaptation Strategy and Action Plan is Edmonton’s Climate Change Adaptation Plan (City of Edmonton 2018), outlines how the City of Edmonton will plan and invest resources to increase our communities’ climate resilience and minimize the exposure of people and assets to the impacts of climate change. The plan identifies river flooding as a result of changing precipitation as one of the climate variables that will impact the City of Edmonton, “Changing precipitation that leads to urban or river flooding can have a direct impact on facilities such as the water treatment system as well as residential or commercial buildings” (City of Edmonton 2018).

Under Path 3 Preparing for Changing Precipitation, the Plan identifies a goal regarding Edmonton’s water supply, as follows, “Edmonton’s water supply is secure and safe for current and future Edmontonians”, with action items that include a partnership with EPCOR and other stakeholders to enhance long-term source water security and protection planning for water quantity and quality.



EPCOR WTP FLOOD MITIGATION BARRIERS SITE LOCATION STUDY, EDMONTON, ALBERTA

Opportunities and Constraints Analysis
February 23, 2023

The goals and action items of this climate change adaptation plan align directly with the Project, to protect water treatment infrastructure in the context of climate change and resulting changes to overland flood risk.

3.4.5 Ribbon of Green SW + NE Plan

The Ribbon of Green SW + NE Plan provides policy direction to guide the planning, programming, and management of the southwest and northwest portions of the NSR valley (City of Edmonton 2020b). The E.L. Smith WTP falls within the southwest portion of the plan area, and the Rosedale WTP lies within the Ribbon of Green Future Amendment Areas. A portion of the E.L. Smith WTP site is classified as Active /Working Landscapes, and the other portion is classified as Preservation. The Plan indicates that urban services such as water treatment is appropriate within Active/Working Landscapes. The direction in Section 2.1.2 (r) (Protecting the Ribbon of Green SW + NE) indicates that infrastructure within the flood fringe can withstand periodic flooding. And Section 3.4.7.2 (Specific Intensive Recreation Direction)(aa) indicates public facilities are to be adequately protected from flooding.



Conclusions
February 23, 2023

4.0 CONCLUSIONS

The Project will include the construction of flood mitigation works designed to mitigate the risk of overland flooding in a 1:500-year event at the E.L. Smith and Rossdale WTPs. These WTPs provide safe drinking water to Edmonton and many other regional municipalities in Alberta. Both WTPs are critical infrastructure that are located on the lower terrace of the NSR valley and are vulnerable to overland flooding.

The existing critical infrastructure WTP to be protected by the Project occurs within the Bylaw 7188 boundary. There are no reasonable scenarios where overland flood mitigation structures could be located anywhere else than directly proximate to the existing WTP sites. The Project is dependent on the NSR valley location.

The SLS examined the opportunities and constraints associated with Project implementation versus status quo (no flood protection of critical infrastructure). The Project aligns directly with the City of Edmonton's Climate Change Adaptation Strategy and Action Plan (City of Edmonton 2018), which includes an action item 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 effects limited to minor magnitude changes to vegetation and wildlife habitat and wildlife movements. These effects were reduced by Project design considerations including siting the majority of the flood mitigation structures on existing disturbance, but were somewhat constrained by the USACE (2000) design requirements to maintain a root-free zone surrounding the flood mitigation structures. 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 climate-change induced overland flooding.



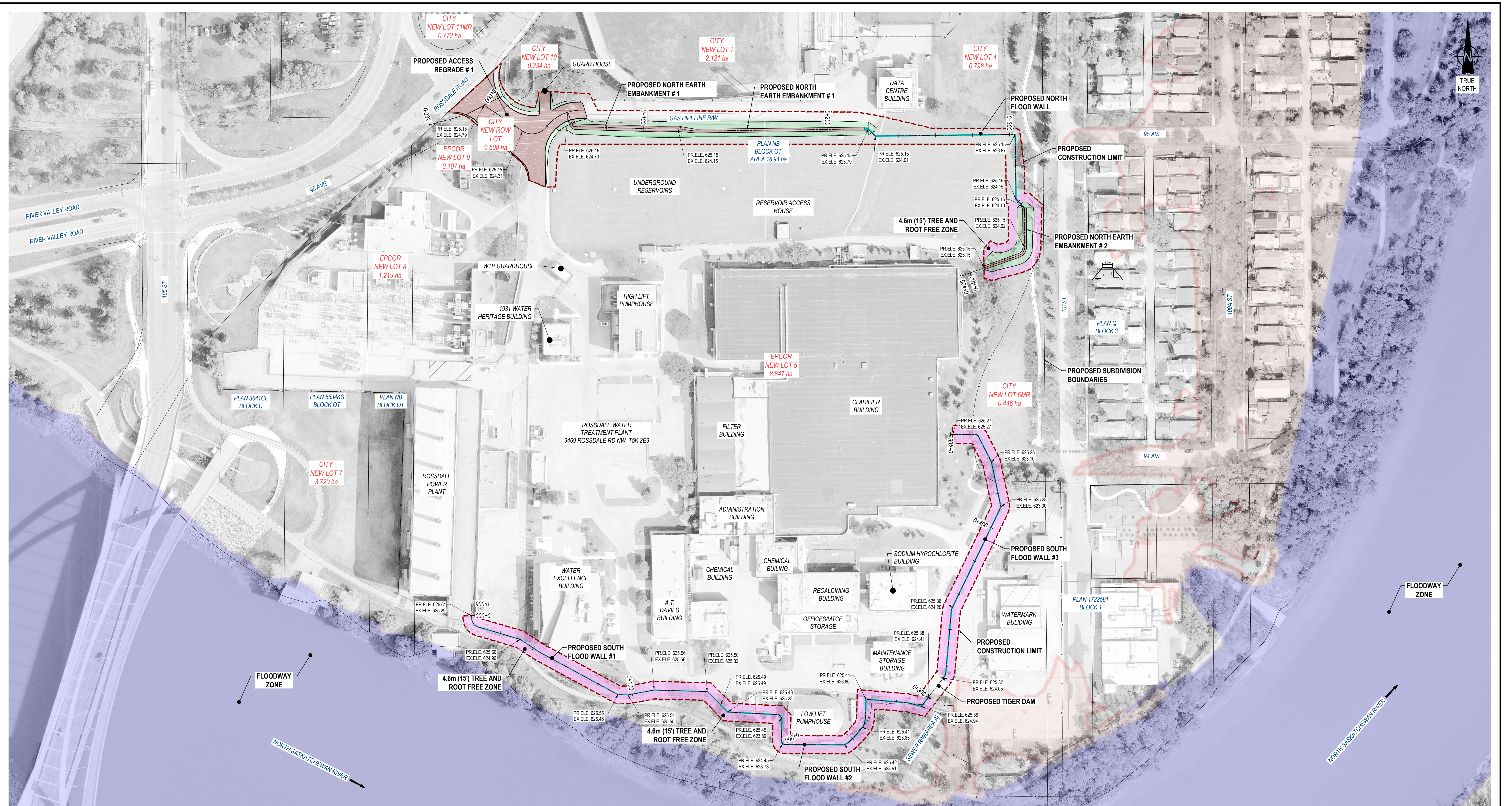
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APPENDIX A

Drawings



SITE PLAN
1:1000





REFERENCE DRAWING DETAILS		REVISION HISTORY			
DRAWING No.	DRAWING TITLE	No.	DESCRIPTION	DATE	BY
		0A	IFR - PRELIMINARY (PRJ # 1004689)	APR/21	BG

PERMIT STAMP

NOT FOR
CONSTRUCTION

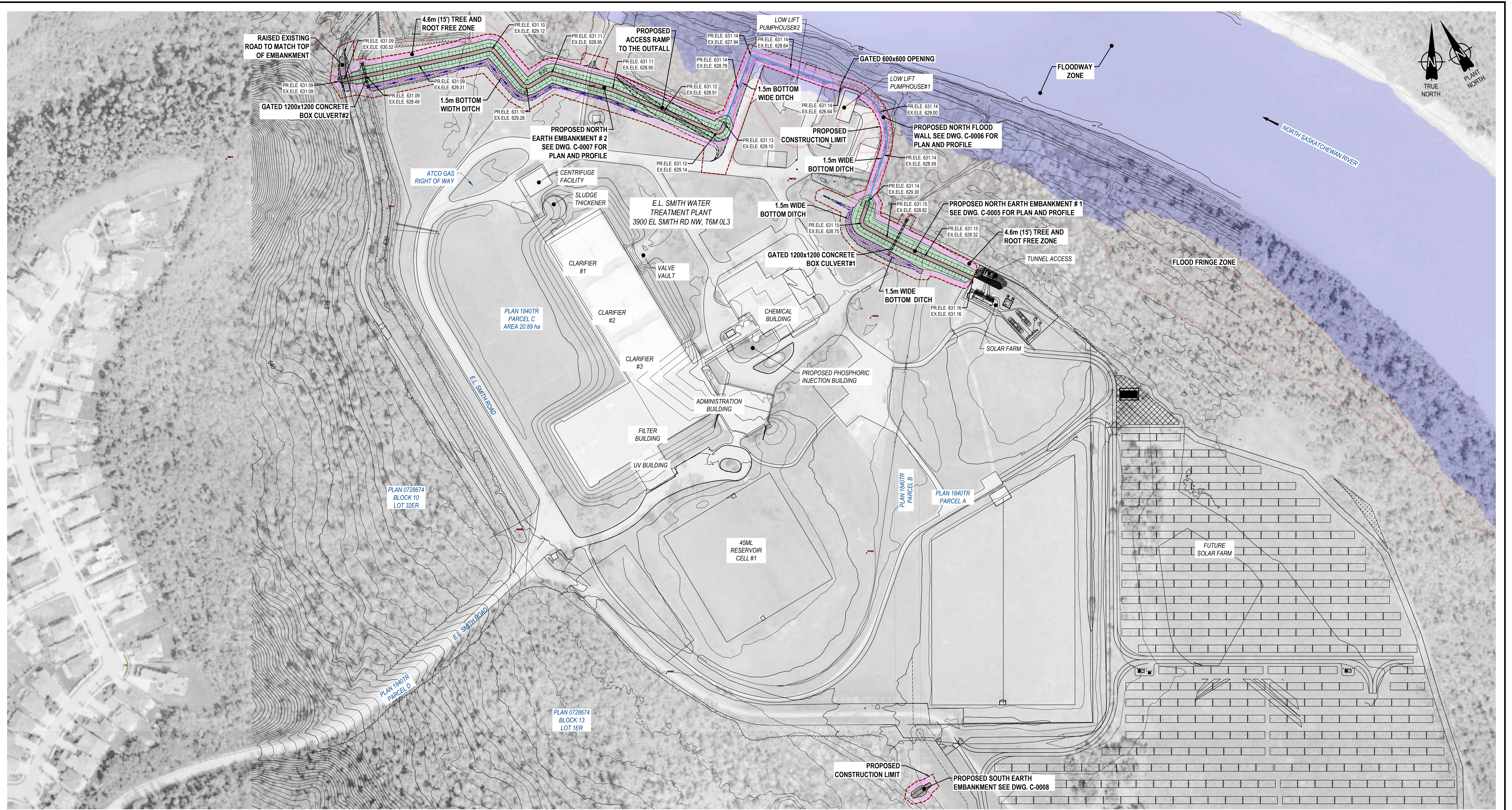
ENGINEERING STAMP

CONSULTANT:

SCALE:	AS NOTED	DATE:	NOV/19
DRAWN BY:	BG	DESIGNED BY:	BG
CHECKED BY:	MB	APPROVED BY:	HA
ENGINEER:		PROJECT MANAGER:	

SITE: ROSSDALE		FUNCTIONAL AREA: PLANT WIDE	
PROJECT NAME: EPCOR WTP FLOOD MITIGATION EMBANKMENTS PROJECT			
DRAWING TITLE: CIVIL SITE PLAN PROPOSED EMBANKMENT AND RETAINING WALL LOCATIONS ROSSDALE			
EPCOR DRAWING NO. E-0-0-C-XXXX	EPCOR PROJECT NO. 1004689	CONSULTANT DRAWING NO. C-0004	CONSULTANT PROJECT NO. 110146440
REV. 0A	SHT. 1		



SITE PLAN
1:1500



DRAWING No.	DRAWING TITLE	No.	DESCRIPTION	DATE	BY
		0B	ISSUED FOR REGULATORY APPLICATION	JUN/21	BG
		0A	IFR - PRELIMINARY (PRJ #1004689)	APR/21	BG

REFERENCE DRAWING DETAILS		REVISION HISTORY			
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PERMIT STAMP	ENGINEERING STAMP
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CONSULTANT:	Stantec
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SCALE:	AS NOTED	DATE:	FEB/21
DRAWN BY:	BG	DESIGNED BY:	BG
CHECKED BY:	MB	APPROVED BY:	MW
PROJECT MANAGER:			

SITE:	E.L. SMITH	FUNCTIONAL AREA:	PLANT WIDE
PROJECT NAME:	EPCOR WTP FLOOD MITIGATION EMBANKMENTS PROJECT		
DRAWING TITLE:	CIVIL PROPOSED EMBANKMENT AND FLOOD WALL LOCATIONS DETAIL, PLAN, SECTION EL SMITH		
EPCOR DRAWING NO.	EPCOR PROJECT NO.	CONSULTANT DRAWING NO.	CONSULTANT PROJECT NO.
E-0-0-C-XXXX	1004689	C-0004	110146440
REV.	SHT.		
0B	1		