Attachment 1

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Environmental Impact Assessment:
18 Street over Horsehills Creek Bridge Replacement

City of Edmonton

Final Report

September 2024

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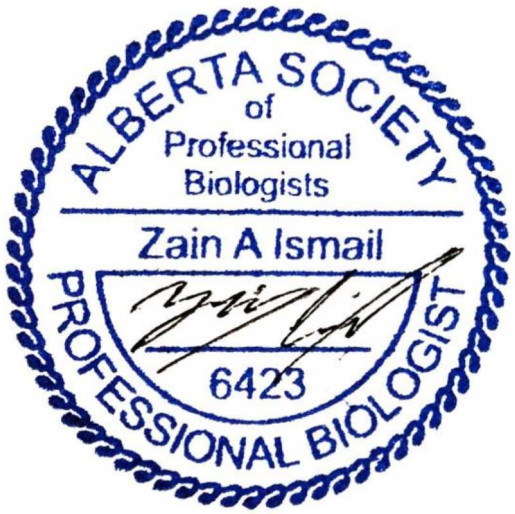
ISL Engineering and Land Services Ltd.

Author



Zain Ismail, B.A.Sc., P.Biol., R.P,Bio
Environmental Scientist

Reviewer

Brent Piche, B.Sc., P.Biol., R.P.Bio
Lead, Environmental Services

Executive Summary

The City of Edmonton is proposing to replace the Horsehills Creek Bridge in northeast Edmonton, carrying 18 Street over Horsehills Creek north of Manning Drive. This Environmental Impact Assessment (EIA) was developed by ISL to review the existing environmental conditions, determine potential impacts and make recommendations for mitigation.

Environmental desktop and field surveys were conducted for wildlife, fish, vegetation, wetlands and historical resources. Wildlife habitat in the area was determined to be of moderate value and included a previously used Barn Swallow nest (designed May Be at Risk in Alberta); pre-construction nest sweeps will be required if clearing activities occur within the nesting window (March 15-Aug 31). Horsehills Creek has historical records of Flathead Minnow and the field survey concluded that habitat ratings for the study area were considered "Good" for non-sportfish. A Request for Review has been submitted to Fisheries and Oceans Canada as the bridge replacement requires work within the wetted width of the creek. Vegetation surveys resulted in no findings of rare plants or plant communities. Wetland assessment identified a watercourse fringe wetland, a Wetland Assessment Impact Form (WAIF) will be submitted with the *Water Act* Application for impacts due to the project. A review for Historical Resources concluded that due to previous disturbance and the shallow nature of the construction, there is low likelihood of encountering previously undiscovered archaeological or paleontological resource sites.

Mitigation measures have been incorporated throughout the design process including minimizing disturbance footprint and the selection of a longer bridge span. Recommendations for mitigation throughout construction are provided throughout the EIA; the Contractor's ECO Plan will address environmental risks and mitigation for the construction phase.

The Draft EIA was circulated throughout City Departments. Appendix J includes a Comments/Response Log to summarize City comments and changes made to the EIA in response. Additionally, a request was made to develop a Concordance Table to summarize potential environmental impacts and mitigation measures during the design and construction phases; this is included in Appendix J. This report is issued as a Final EIA for The Project.

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FIGURES

1.0
Introduction

1.1 Introduction

The City of Edmonton (the City) is proposing to replace the Horsehills Creek Bridge (B081) in Edmonton, Alberta (the Project). The Bridge location is depicted in Figure 1.1. The Project is in northeast Edmonton and carries 18 Street over Horsehills Creek about 400 m north of Manning Drive.

1.2 Environmental Impact Assessment Objectives

An Environmental Impact Assessment (EIA) Terms of Reference (TOR) was developed by ISL by following the Government of Alberta's (GOA) *Guide to Preparing Environmental Impact Assessments in Alberta* (2013) in conjunction with the City's *Urban Growth and Open Space* (UGOS) in January 2024, following the *North Saskatchewan River Valley Redevelopment Plan* (City of Edmonton 2000). A copy of the TOR is provided in Appendix A.

As this is a major capital project, the appropriate level for the assessment was determined to be an EIA. This EIA provides a summary of existing environmental conditions in the Project Area, an assessment of potential interactions of the Project's Valuable Ecosystem Components (VECs), and mitigation measures. This EIA also provides information on required regulatory approvals, permits and best practices required to remain in compliance with federal and provincial legislation in addition to municipal policies.

1.3 Study Area

The Study Area for the desktop portion of this EIA is a 2 km radius from the proposed project disturbance limits (Project Area) (Figure 1.2). The Study Areas for the fieldwork are defined by each VEC:

- The aquatics study focused on Horsehills Creek from 100 m upstream of the bridge to 300 m downstream of the bridge;
- The wildlife study reviewed a 4 km radius around the bridge site for potential species at risk and a 100 m radius during the field assessment; and
- The vegetation study reviewed the entirety of the Project Area, including proposed laydown areas.

The Local Study Area (LSA; Figure 1.3) used for this EIA is based on the area with the potential to be directly impacted by construction and indirect construction effects including access and laydown, stockpile or other temporary use areas. The LSA also includes connected similar natural habitat types outside of the direct and indirect construction area. It also includes potential areas of recreational and visual impacts.

1.4 Report Organization

This EIA is structured in accordance with the agreed-upon TOR. It encompasses an introductory section, an overview of existing conditions for each VEC, a description of the project, an examination of potential impacts and proposed mitigation measures, suggestions for environmental monitoring during the construction phase, a summary of impacts, and a closing statement. Additional information relevant to each section is presented in the appendices.

1.5 Historical Background

Historical air and satellite photographs, from 1949 to 2007, are provided in Appendix B. As shown, land use in the Project Area has been consistent throughout this timeframe as largely agricultural.

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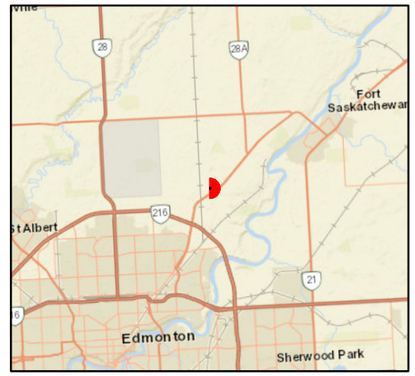

LEGEND

Bridge Replacement

TITLE

PROJECT LOCATION OVERVIEW

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

0 0.005 0.01 0.02

1:750 KM

FIGURE	1.1
DATE	2024-02-02
PROJECT NO.	16547
AUTHOR	RG

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Envio\16447_Figure_1.1_Project_location.mxd

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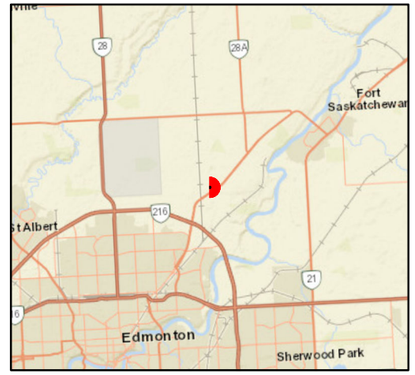

LEGEND

- Bridge Replacement
- Study Area (2km buffer)

TITLE

STUDY AREA

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

0 0.125 0.25 0.5

1:18,400 KM

FIGURE	1.2
DATE	2024-02-02
PROJECT NO.	16547
AUTHOR	RG

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Legend

Local Study Area (LSA)

TITLE

LOCAL STUDY AREA (LSA)

PROJECT

18 STREET OVER HORSEHILL CREEK
BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map:Pictometry International, Sturgeon County, Esri Community Maps Contributors, City of Edmonton, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, US Census Bureau, USDA, NRCan, Parks Canada

0 0.03 0.05 0.08 0.1
Kilometers

FIGURE	1.3
DATE	7/16/2024
PROJECT NO.	16547
AUTHOR	RGamber

Document: E:\GIS\Projects\16547_18_St_Horsehill_Bridge_Replacement\16547_18_St_Horsehill_Bridge_Replacement.aprx - Figure 1.3 Local Study Area for EIA

2.0
Project Description

2.1 Project Need and Rationale

The existing bridge consists of a single-span (8.5 m) precast concrete girder superstructure on timber substructure originally built in 1961. As evidenced by the inward movement of the abutments, extensive timber rot, shear cracks in the girder legs and concrete deterioration, the bridge is approaching the end of its service life. At the bridge site, 18 Street is a rural cross-section roadway carrying two-way traffic in a north-south direction. Horsehills Creek is a small meandering creek that flows south parallel to 18 Street before being joined by another stream and bending sharply east at the crossing location.

2.2 Project Design

As the Project is still in the Preliminary Design stage, final construction staging, schedule and site preparation details are not available. Design overview, as recommended in the Preliminary Design Report (ISL 2024), is summarized below for consideration in this EIA.

Existing Bridge

The existing bridge is located on 18 Street NW over Horsehills Creek. The road supports relatively low traffic. The existing superstructure is an 8.5 m span precast concrete girder on treated timber abutment. The treated timber foundation has reached the end of its service life and is showing signs of tilting. The project site has been earmarked for the future Edmonton Energy and Technology Park (EETP), which is a planned future growth area for research and commercialization for the energy sector.

2.3 Project Alternatives Considered

Three bridge replacement options were considered: Alberta Transportation and Economic Corridors (TEC) standard SLC girder bridge; SLW girder bridge; and a concrete box culvert. ISL reviewed the replacement options so that they align with the City's primary objective for the Project: to use a similar structure that meets current and future functional requirements, minimizes environmental impacts, and provides value for money.

Option 1 – SLC Standard Bridge

A 10 m span standard SLC girder bridge was considered with a cast-in-place abutment. The overall structural depth of this option is 725 mm. As the existing road did not meet the desired width for a rural industrial collector, ISL explored two sub options. Sub-option A investigated widening the road to the desired 9 m, whereas Sub-option B placed the bridge within the footprint of the existing road width.

The options considered using an SLC girder standard bridge were:

- Option 1A: 10 m span SLC girder standard bridge with road widening; and
- Option 1B: 10 m span SLC girder standard bridge without road widening.

Option 2 – SLW Standard Bridge

A 10 m span SLW girder standard bridge was considered with a steel backwall. SLW girders allow for asphalt to be placed without a deck, thereby reducing the overall structural depth to 600 mm.

Similar to Option 1, two sub-options were explored by ISL. Sub-option A looked into widening the road to the desired 9 m, whereas Sub-option B placed the bridge within the footprint of the existing bridge. The options considered using an SLW girder standard bridge were:

- Option 2A: 10 m span SLW girder standard bridge with road widening; and
- Option 2B: 10 m span SLW girder standard bridge without road widening.

Option 3 – Concrete Box Culvert

Due to the lower cover at the crossing, a concrete box culvert was deemed more suitable than a CSP culvert. The concrete box culvert still posed challenges in maintaining the fish passage and could lead to delays and increased costs due to Department of Fisheries and Oceans (DFO) approval requirements. Ultimately, the concrete box culvert was deemed unsuitable for the location due to divergence with the City's environmental priorities, leading to its exclusion from further consideration.

Selected Option

The selected option is Option 2A, which was a 10 m span SLW six-girder line standard bridge on steel abutments with road widening. The recommended bridge is longer than the existing bridge, which allows for the substructure of the new bridge to be installed behind the existing abutments without disrupting the creek. The substructure will use a 2:1 headslope with riprap to accommodate elevation differences and provide erosion prevention and better wildlife passage.

2.4 Project Details

2.4.1 Project Location and Setting

As detailed in Section 1.1 and shown on Figure 1.1, the Project is located in northeast Edmonton and carries 18 Street over Horsehills Creek about 400 m north of Manning Drive.

2.4.2 Current Land Use

The current land use at the Project is mainly road right-of-way. Beyond the road right-of-way is agricultural land and natural area near Horsehills Creek, where the land cannot be feasibly cultivated.

2.4.3 Natural Subregion

The Parkland Natural Region (the Region) has been strongly influenced by agriculture for more than 100 years and is densely populated. The remaining native vegetation is a mosaic of aspen and grasslands. Grassland vegetation communities dominate the southern areas of the region with small aspen dominated communities occurring in moister habitats. The northern parts of the Region are composed of aspen or aspen and balsam poplar forest with grasslands being restricted to the driest areas (NRC 2006).

The Central Parkland Natural Subregion (the Subregion) occupies over 50,000 km² of land and most of these lands are under cultivation. Undulating till plains and hummocky uplands dominate the landscape. Lacustrine and fluvial deposits are common with some substantial eolian deposits in the northern and eastern parts of the Subregion. Plains rough fescue dominates the vegetation communities in the southern and eastern areas of the Subregion with trembling aspen dominated communities occurring in moister habitats. The northern and western parts of the Subregion are composed of aspen forest with grasslands restricted to the driest areas. Black Chernozem soils normally occur under grasslands while Dark Grey Chernozems and Luvisols generally occur in aspen forests (NRC 2006).

2.4.4 Project Construction Details

Construction is currently scheduled to occur in 2025, pending Council approval of the EIA, receipt of environmental approvals and tendering. The specifics of construction work hours will be in compliance with the City’s Community Standards Bylaw and will be presented in an Environmental Construction Operation (ECO) Plan.

2.4.5 Construction Methodology, Materials and Equipment

The Project will involve the following construction activities at the bridge site:

- Installation of temporary bridges for access (potentially utilizing the existing bridge decks where possible);
- Completing any required earthworks (grading, removal of existing abutments, etc.);
- Installation of foundation piles;
- Casting abutments and wing walls; and
- Completing backfill and earthworks.

2.4.6 Construction Staging and Access

It is expected that the bridge works will require a full closure of 18 Street with a detour to adjacent roads. Therefore, staging and access will be completed on the existing roadway.

2.4.7 Construction Mitigation Measures

The awarded contractor will prepare an ECO Plan prior to any construction activity starting. The ECO Plan will discuss spill prevention and cleanup, emergency procedures, erosion and sediment control (ESC), types of machinery and equipment used, and describe waste disposal. To reduce the potential effects of the construction activities on the VECs, the key mitigation measures listed in Section 5.0 of this report is recommended. The Contractor is expected to follow and meet the City's Enviso Program requirements (City of Edmonton 2024a).

2.4.8 Land Use and Zoning

As shown in Figure 2.1 below, the Project Area is currently zoned as within the North Saskatchewan River Valley and Ravine Area (City of Edmonton 2024b). It additionally falls within the Bird Hazard Airport Protection Overlay. The land in the Project Area is owned by the City and is currently being used as roadway and right of way.

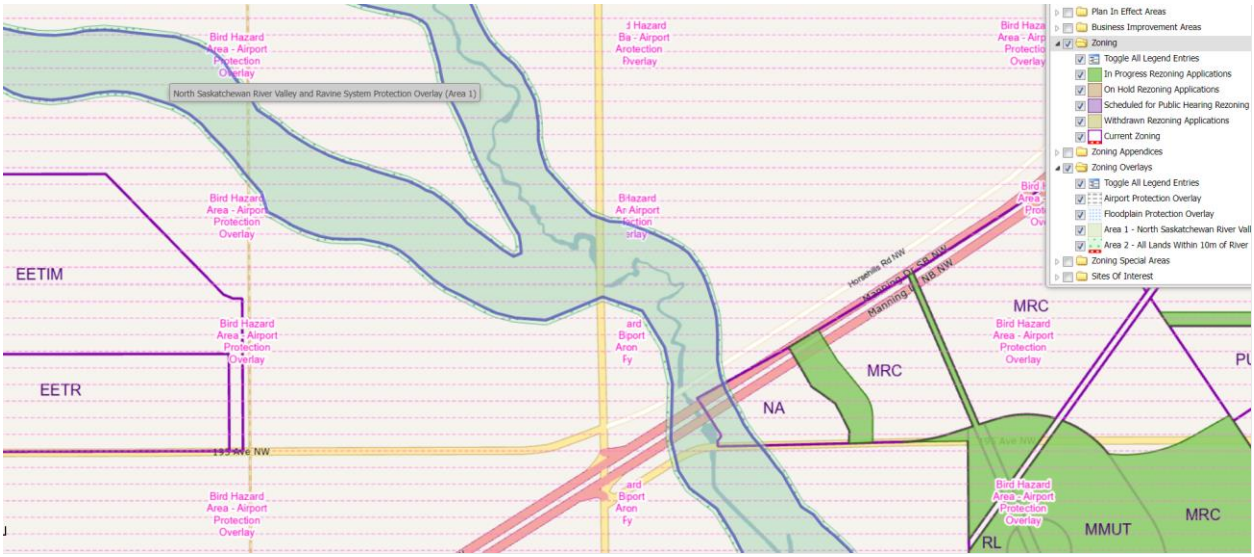


Figure 2.1: Zoning (City of Edmonton SLIM Maps [City of Edmonton 2024b])

2.4.9 Public Consultation

A decision map and a communication plan were created for the project. During this process, no public engagement was required, as the bridge replacement project has complex and technical decisions the public cannot influence. Information around the project has been communicated with neighbouring properties. Information will be shared about construction details, including timing and bridge and road closures, closer to construction starting for the project.

2.4.10 Scope of Work

The Project is a bridge replacement project. The VECs were selected based on distribution and status of environmental elements in the vicinity of the Project, potential public and regulatory concern, as well as professional judgement in consultation with Urban Growth & Open Space during the development of the TOR (City of Edmonton 2024b). VECs selected include: geotechnical (geology/slope stability/soils); hydrology/surface drainage; fish and fish habitat; wildlife and wildlife habitat; vegetation; historical resources; recreational resources; and visual resources. The VECs were assessed by means of desktop and field surveys in the spring and summer of 2024.

2.5 Environmental Permitting Requirements

This section provides information on the expected regulatory requirements for the Project, including background on the regulatory process and the anticipated requirements for the Project.

2.5.1 Federal

Fisheries Act

The provisions of the *Fisheries Act* came into force at the end of August 2019 (DFO 2019). Important prohibitions include:

- 34.4 (1) No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish
- 35 (1) No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat
- Harmful Alteration: any change to fish habitat that reduces its long-term capacity to support one or more life processes of fish but does not permanently eliminate the habitat
- Disruption: any change to fish habitat occurring for a limited period of time that reduces its capacity to support one or more life processes of fish
- Destruction: any permanent change of fish habitat, which completely eliminates its capacity to support one or more life processes of fish

As the bridge replacement requires work within the wetted width of Horsehills Creek, it is expected that a Request-for-Review will be required for the Project. At this time, it is expected that the DFO review will return a Letter of Advice. An authorization may be triggered by DFO, if they determine there is a harmful alteration, disruption or destruction of fish habitat.

Migratory Birds Convention Act

Environment and Climate Change Canada (ECCC) administers the *Migratory Birds Convention Act* (MBCA) to ensure the safeguarding of migratory birds, their nests, and eggs (GOC 1994). ECCC establishes general nesting periods based on geographic locations for the protection of migratory birds (ECCC 2023). While the general nesting period is applicable to most species under the MBCA, it may not accurately represent species that can breed under optimal conditions throughout the year or those that may nest earlier or later (ECCC 2017). It is essential to acknowledge that this timeframe might not encompass nesting periods for species not covered by the MBCA but protected under Alberta's *Wildlife Act*.

For the Project, the general migratory bird nesting period is specified as April 15 to August 31 (Nesting Zone: B4), with special consideration for owls and raptors, which may commence nesting as early as March 15 (ECCC 2017).

Pre-disturbance nest surveys should be conducted if work occurs between March 15 to August 31, and additional mitigation and/or onsite monitoring may be required pending results. If nesting migratory birds are identified during the nest sweep, a setback may be identified through consultation with ECCC where feasible. If the Project is to be scheduled within the migratory bird breeding period, proactive measures should be taken to discourage swallow nesting on the underside of the bridge. This includes blocking, screening, or tarping the exposed ends. No specific permit is required to meet the MBCA.

Canada Navigable Waters Act

The *Canada Navigable Waters Act*, administered by Transport Canada, provides protection of navigation on all public navigable waterways in Canada through the Navigation Protection Program (Transport Canada 2020). Regulatory approval is required in scheduled navigable waters, as well as waters that are considered Navigated, where the works risk a substantial interference with navigable.

Horsehills Creek is not considered a Scheduled Waterbody and is not considered 'Navigable'. No submission to the Navigation Protection Program is required for the Project.

Species at Risk Act

The *Species at Risk Act* (SARA) is federal legislation intended to protect sensitive species (GOC 2002). In relation to wildlife species listed under Schedule 1 of SARA, it is prohibited to:

- kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species
- possess, collect, buy, sell or trade an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species, or any part or derivative of such an individual
- damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada

With the implementation of site specific and general mitigation measures, the Project is not anticipated to interact with any of the wildlife species listed under Schedule I of SARA. No aquatic species at risk are present within the Project Area. Therefore, additional regulatory notifications and permit applications under Section 73 of SARA are not required.

2.5.2 Provincial

Water Act

The *Water Act* contains the requirements for managing Alberta's water resources. Through AEP, the *Water Act* governs activities affecting waterbodies in Alberta, including construction, water diversions, and infilling of wetlands. *Water Act* approval is required to alter the flow or level of water; change the location of water; change the direction of water flow; cause the siltation of water; cause erosion of bed or shore of any waterbody; or if there is any anticipated effect on the aquatic environment (GOA 2022).

Water Act Code of Practice

Activities that will disturb a waterbody require *Water Act* approval. The exception are those activities that are regulated under the Codes of Practices (COPs) (Alberta Environment and Sustainable Resource Development [AESRD] 2012):

- Temporary diversion of water for hydrostatic testing
- Pipelines and telecommunication lines crossing a waterbody
- Watercourse crossings
- Outfall structures on waterbodies

A *Water Act* Code of Practice notification will be required for the Project as it will involve installation of a bridge structure over Horsehills Creek (GOA 2019). Horsehills Creek is an Unmapped Class C waterbody that would inherit the Restricted Activity Period of September 16 to July 31 of the North Saskatchewan River (AESRD 2012). Under the Code, work can occur under the RAP following the recommendations of a Qualified Aquatic Environmental Specialist (QAES), which will be provided in this EIA.

Wetland Policy

Under the authority of the *Water Act,* wetlands must be identified and delineated according to the Wetland Identification and Delineation Directive (GOA, 2015a); classified using the Alberta Wetland Classification System (ESRD 2015); and assigned an ecological wetland value using the Alberta Wetland Rapid Evaluation Tool - Actual (ABWRET-A) (GOA 2015b). A *Water Act* application for this Project will require a Wetland Assessment and Impact Report (WAIR). In addition to the above information, a WAIR will include the required *in-lieu* fee replacement value; based on the ABWRET-A results (i.e., wetland value), as well as Relative Wetland Assessment Unit value pursuant to the Alberta Wetland Mitigation Directive (GOA 2018).

One river fringe wetland is expected to be impacted during construction. A WAIR will be a required attachment to the *Water Act* application submission.

Public Lands Act

The *Public Lands Act* requires surface disposition be issued for the use of all public lands in Alberta. The *Public Lands Act* is responsible for administering lands owned by the Crown. Under Section 3 of the *Public Lands Act*, public lands include the bed and shore of all permanent and naturally occurring waterbodies, unless the title has been granted to a private landowner.

Under Section 3 of the *Public Lands Act*, the Province claims ownership of the bed and shore of Horsehills Creek in the Project Area. However, the existing bridge occurs within a Road Allowance, which is not considered within Crown-claimed land. Provided the works, in their entirety, occur within this road allowance, no Public Lands Disposition (DLO) will be required.

Wildlife Act

In addition to the federal MBCA, birds may be protected provincially under the *Wildlife Act* (GOA 2000). AEP administers the *Wildlife Act*, which influences and controls human activities that may have adverse effects on wildlife or wildlife habitat on both Crown and privately owned land. Section 36(1) of the *Wildlife Act* states that a person shall not willfully molest, disturb, or destroy a house, nest, or den of prescribed wildlife or beaver dam in prescribed areas and at prescribed times. This applies to nests and dens of endangered wildlife, migratory birds, snakes (except prairie rattlesnakes), bats and prairie rattlesnake hibernacula. Additionally, Section 36(1) also applies to beaver dens and houses on land that is not privately owned, as well as houses, nests, and dens of all wildlife in a wildlife sanctuary and nests of game birds in game bird sanctuaries (ECCC 2023).

No formal submission under the *Wildlife Act* is required.

Historical Resources

The *Historical Resource Act* is administered by Alberta Ministry of Arts, Culture and the Status of Women (ACSW) to preserve and study Alberta's historical resources (GOA 2000a). Historical Resources are: archaeological resources, paleontological resources, historic structures and traditional use sites. All projects in Alberta must consider Historic resources. Historical Resource sites are governed under the *Historical Resources Act*. *Historical Resources Act* clearance must be obtained by ACSW before development.

A Historical Resource Overview (HRO) has been completed for the Project by Turtle Island Cultural Resource Management Inc. (Turtle Island) and has indicated that no additional review is required. The HRO has been submitted to the Province for approval and it is anticipated that no additional historical studies will be required.

Weed Control Act

The *Weed Control Act* protects stakeholders from economic and invasive losses caused by weeds. Some weed species exhibit extreme growth habits, which can have consequences for line of sight at intersections, wildlife control along roadways, culvert and outfall maintenance, agricultural production, livestock forage quality, and many others (GOA 2010). The *Weed Control Act* prescribes activities that must be undertaken should a Noxious or Prohibited Noxious weed be encountered. Each municipality is responsible for enforcing the *Weed Control Act* (GOA 2010).

Under Part 4 *Weed Control Act* (GOA 2010), it states that:

- A person shall control a noxious weed that is on land the person owns or occupies.
- A person shall destroy a prohibited noxious weed that is on land the person owns or occupies.
- Subject to the regulations, a person shall not use or move any thing that, if used or moved, might spread a noxious weed or prohibited noxious weed. Subsection (1) does not apply if the thing is used or moved in a manner directed by an inspector under Section 13.
- A person shall not deposit or permit to be deposited noxious weed seeds or prohibited noxious weed seeds where they might spread.
- A person shall store refuse that may contain noxious weed seeds or prohibited noxious weed seeds, including screenings from cleaning, sizing or grading seed, in a container that will prevent the scattering of the seeds. Subsection (2) does not apply if the refuse is disposed of in a manner directed by an inspector under Section 13.

Weed species listed by the *Weed Control Act* were identified during the vegetation studies assessment and measures to satisfy the *Weed Control Act* will be identified and implemented by the Contractor in their ECO Plan.

2.5.3 Municipal

Community Standards Bylaw 14600

The Community Standards Bylaw 14600 establishes construction activity periods (7AM to 9PM Monday to Saturday; Sunday and Holidays: 9AM to 7PM) and acceptable noise levels for non-residential areas (maximum 75 dBA).

It is a requirement that this Bylaw be adhered to during construction unless an exception is granted (City of Edmonton 2023).

Corporate Tree Management Policy C456A

Loss of City-owned trees (Ornamental and Natural stands) will be protected and preserved and, when they cannot be, must be equitably compensated for in accordance with the City of Edmonton's *Guidelines for Evaluation of Trees* (2024b, 2019a). No work is to begin unless a Tree Preservation or Tree Protection Plan has been approved by a City of Edmonton urban forester.

A Tree Preservation or Tree Protection Plan is required if work occurs within 10 meters of a Natural Stand (City of Edmonton 2022a). A Tree Protection Plan will be prepared, if deemed required following preliminary design, separately from this report. If a like-for-like replacement occurs, it is unlikely that any trees are within 10 meters that would require protection.

City of Edmonton Wildlife Passage Guidelines

The City of Edmonton provides recommendations to incorporate the needs of wildlife into construction projects and, while this guideline pertains to transportation projects, some construction and maintenance guidelines and best management practices are relevant (City of Edmonton 2010). This includes minimizing tree removal, avoiding work during ecologically sensitive periods, avoiding site pollution, control of erosion and sediment, and worker education.

Potential impacts to wildlife passage will be minimized by implementing the mitigation measures detailed within this EIA and requiring that they be incorporated into the Contractor's ECO Plan.

City of Edmonton Natural Area Systems Policy C531

Natural Area Systems Policy C531 (City of Edmonton 2007) is intended, among other things, to conserve, protect and restore biodiversity and natural area systems throughout Edmonton, recognizing the urban context of the city.

This policy directs administration to require ecological information to support planning and development applications, for which this EIA provides.

City of Edmonton ENVISO Program

ENVISO is an environmental management system (EMS) that aims to manage and improve the City of Edmonton's environmental performance (EMS - ISO 14001).

An ENVISO checklist of environmental and regulatory requirements fulfills this ENVISO requirement (Appendix C, City of Edmonton 2024a), and it is expected that the Contractor will follow all ENVISO requirements through construction.

City of Edmonton Drainage Bylaw 18093

The release of materials into the water, including potentially contaminated runoff into watercourses, is regulated locally by the City of Edmonton Drainage Bylaw (2021). It is prohibited to release hazardous and other materials into a watercourse or to the stormwater system.

If discharge is required, a permit through Drainage Regulatory Services is required, and will be coordinated by the Contractor.

City of Edmonton Bylaw 7188 Environmental Review

The Project is located within the North Saskatchewan River Valley area, managed under the City's *North Saskatchewan River Valley Development Plan*, *Bylaw 7188* and amendments (2018). The North Saskatchewan River Valley and Ravine System is considered the most unique natural feature in Edmonton and the largest urban open space in North America (City of Edmonton 2018). The major goals of the North Saskatchewan River Valley Area Redevelopment Plan relevant to this Project are: environmental preservation, and to provide cultural, recreational and aesthetic benefits to Edmontonians and visitors.

An environmental review is required for most activities in the River Valley (City of Edmonton 2000). Largescale capital works, excavation or new construction with a change of existing use would be defined as Major Work; this requires an EIA.

In January 2024, the City's UGOS confirmed that replacement of the existing bridge would be considered Major Work and thus requires an Environmental Impact Assessment (EIA) under Bylaw 7188, to be reviewed by internal City departments and ultimately by City Council.

This EIA is prepared for the purpose of addressing the requirements of Bylaw 7188. UGOS also advised that a Site Location Study would not be required as the works are occurring within the existing Project Area.

2.5.4 Environmental Permit Approval Checklist

An IIS-F-1018 Environmental Permit Checklist has been completed and attached as Appendix C to provide clarification and a summary of the relevant regulatory approval requirements. These requirements may change through detailed design and should be revisited throughout the design process.

3.0 Methodology

3.1 Methods and Steps Used to Prepare this EIA

General methods used in the preparation of this EIA were based on the guidelines presented in Bylaw 7188 and the preliminary list of key resources identified in *A Guide to Environmental Review Requirements in the North Saskatchewan River Valley and Ravine System* (City of Edmonton, 2000), as well as through the scoping exercise with UGOS. Additional environmental resources with a potential to be impacted by the Project were identified during the desktop and field assessments.

The assessment focused on the existing conditions surrounding VECs, potential effects of the Project on the VECs, identification of mitigation measures to reduce or eliminate the impacts and evaluation of residual effects and analysis of these effects.

3.2 Literature Review

A desktop review was completed for all VECs, where applicable. Technical reports and previous studies were reviewed and incorporated into the EIA, including:

- Thurber Engineering Geotechnical Assessment (Thurber 2024);
- Natural Regions Committee (NRC 2006);
- City of Edmonton Biodiversity Report (Hobson, et. al, 2008); and
- Environmentally Significant Areas in Alberta (Fiera 2014).

The following databases were queried for relevant information pertaining to the Project and included within the EIA:

- The Agricultural Regions of Alberta Soil Inventory Database (AGRASID [Alberta Agriculture, Food and Rural Development 2024]);
- Alberta Conservation Information Management System (ACIMS); and
- Alberta Fish and Wildlife Internet Mapping tool (FWMIT).

3.3 Assessment Scoping

The VECs were selected based on distribution and status of environmental elements in the vicinity of the Project, potential public and regulatory concern, as well as professional judgement in consultation with Urban Growth & Open Space during the development of the TOR (City of Edmonton 2024a). VECs selected include: geotechnical (geology/slope stability/soils); hydrology/surface drainage; fish and fish habitat; wildlife and wildlife habitat; vegetation; historical resources; recreational resources; and visual resources. The VECs were assessed by means of desktop and field in the spring and summer of 2024.

3.4 VEC Methodology

3.4.1 Geology, Slope Stability and Soils Methodology

A geotechnical assessment, including an environmental site assessment (ESA), was completed by Thurber for the Project as part of their geotechnical program, and the results of their various reports were reviewed and summarized as part of the EIA.

3.4.2 Hydrology and Surface Drainage Methodology

A hydrotechnical investigation was undertaken for the Project by ISL's hydrotechnical engineering team, and the report was reviewed and summarized for consideration within this EIA.

3.4.3 Fish and Fish Habitat Methodology

A review of AEP's Fish and Wildlife Management Information Tool (FWIMT) was queried to determine known species occurrences within a 2-km radius from the center of the Project (ESRI 2022; AEPA 2024).

An open water aquatic assessment was completed by a fisheries biologist with a Professional Biologist designation (P. Biol.) on May 15, 2024.

The objectives for the aquatic assessments included:

- Documenting fish use, aquatic habitat condition and habitat potential in the area of each proposed crossing;
- Identifying any fisheries constraints in regard to the potential crossing location;
- Describing the potential effects of the Project on fish and fish habitat; and
- Providing mitigation measures from a P.Biol. to be considered in future phases of the Project to minimize the effects on the aquatic environment.

Habitat assessment data was collected approximately 100 meters upstream to 300 meters downstream of the watercourse crossing, which represents the potential Zone-of-Influence influenced by Project construction. The determination of the final length of the Study Area was made by the P.Biol, considering various factors such as constraints, stream gradient, channel width, channel depth, morphology, flow velocity, and potential disturbances caused by the Project.

Four transects were completed: one at 100 meters upstream of the current crossing, one at the crossing itself, another at 100 meters downstream, and the last one at 300 meters downstream. At each transect, substrate types were visually assessed based on their size and type, including boulder (>256 mm diameter), large cobble (128-256 mm), small cobble (64-128 mm), large gravel (16-64 mm), small gravel (2-16 mm), and fines (<2 mm) (Alberta Transportation 2009), and were recorded. Measurements, such as channel (bankfull) width, wetted width, bank height, and water depth, were recorded using a survey staff to the nearest 0.1 m. Time, dates, location, and transects were documented at each assessment point using a handheld GPS device.

Morphological and riparian vegetation were described for each transect, as well as channel pattern and characteristics. Macro habitat units (e.g., riffle, run, pool, flat) were identified at each transect (Alberta Transportation 2009), and fish habitat was rated according to the potential to support spawning, rearing, overwintering and migration for the representative species most likely to be present at the assessed site (Table 3.1).

Table 3.1: Habitat Suitability Ratings

Habitat Suitability Rating	Description
Excellent	All habitat present is of the highest quality for all life stages of species under consideration.
Good	Habitat present may be slightly limiting for most life stages. Moderate limitations may be present for a particular life stage.
Moderate	Life stages may use habitat occasionally; however, it is not considered the most desirable. Severe limitations may be present for certain life stages or species present.
Poor	All life stages of species under consideration are unlikely to utilize due to moderate to severe limitations to fish health and/or productivity.
Nil	Habitat is unsuitable for all stages of fish life history.

Water quality parameters were measured at each of the transects, including dissolved oxygen, conductivity, pH and water temperature utilizing an ExTech Exstik II and Oakton PCSTestr 35. Turbidity was visually assessed.

Habitat mapping was not completed for the Project, as the entirety of the reach had similar habitat present with limited variety.

3.4.4 Wildlife and Wildlife Habitat Assessment Methodology

Wildlife Desktop Methods

A review of digital aerial imagery was conducted to assess habitat within or near the Project Area and AEPAs Fish and Wildlife Management Information Tool (FWIMT) was queried to determine known species occurrences within a 2-km radius from the center of the Project (ESRI 2022; AEPA 2024). Wildlife species which may reside within the Project Area based on their known habitat preferences were determined with desktop methods by reviewing FWMIT sensitive wildlife layer and species occurrence history (AEPA 2024). Their conservation statuses were determined using the Alberta Wild Species General Status Listing - 2020 (AEPA 2020), the *Alberta Wildlife Act* (AWA) (GOA 2000), and the *Species at Risk Act* (SARA) (Government of Canada [GOC] 2002).

A national map of bird nesting periods from ECCC was searched to determine nesting periods of migratory avian species within the Project (ECCC 2023).

Wildlife Field Methods

The Project Area was assessed using aerial imagery through a desktop analysis, followed by two field visits. The first visit, conducted on January 17, 2024, focused on surveying for potential raptor stick nests and determining habitat connectivity corridors with a winter track survey. The second visit took place on May 5 and included a breeding bird survey, a sharp-tailed grouse survey, a snake hibernaculum survey, an amphibian habitat assessment, and a general habitat assessment. The eastern portion of the Project Area was accessible by foot and surveyed using a random meandering technique in representative wildlife habitats. The western portion, primarily cultivated for agriculture, had few potential habitat features. Due to private land ownership and the lack of representative wildlife habitats, areas west of 18 Street NW were surveyed from the road edge using binoculars. These assessments followed the protocols outlined in the Sensitive Species Inventory Guidelines (AEP 2013).

Winter Tracking Survey

On January 17, 2024, a winter tracking survey was conducted to evaluate wildlife movement and corridors in the Project Area. A single transect was carried out on the east side of the right-of-way, covering a span of approximately 200 m to the south and 200 m to the north of the Project Area. To prevent redundancy in results, only one transect was completed.

Wildlife Habitat Assessment Methods

The wildlife habitat assessment involved evaluating general habitat characteristics to determine potential wildlife features and habitat suitability within the Project Area. The assessment aimed to identify any features or locations suitable for songbird nesting, identifying features suitable for raptor nesting, locating burrowing or mammal denning areas, mapping amphibian breeding areas, and locating potential bat or snake hibernacula sites. Habitats within the Study Area that showed the greatest potential for hosting nesting or denning wildlife were thoroughly evaluated for their suitability, especially focusing on habitat types that included treed and riparian areas.

740000

LSD 8 QS SE Sec 18 Twp 54 Rge 23 W4M

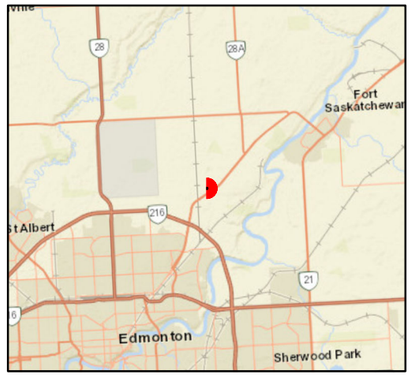
LSD 5 QS SW Sec 17 Twp 54 Rge 23 W4M

LSD 1 QS SE Sec 18 Twp 54 Rge 23 W4M

LSD 4 QS SW Sec 17 Twp 54 Rge 23 W4M

N

740000



LEGEND

- Bridge Replacement
- Wildlife Survey Transect

TITLE

MAY 2024 WILDLIFE FIELD ASSESSMENT AREA

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Copyright Government of Alberta
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

0 0.0175 0.035 0.07

1:2,500 KM

FIGURE	3.1
DATE	2024-05-24
PROJECT NO.	16547
AUTHOR	RG

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Enviro\16447_Figure_3.1_WildlifeSurveyArea.mxd

3.4.5 Wetlands Methodology

Desktop Assessment: The desktop study included a review of the Alberta Merged Wetland Inventory (AMWI; GOA 2018). The AMWI is best used to gain an understanding of the number, size, and location of potential wetlands, as well as the potential wetland classification. The AMWI is a merged dataset containing a number of wetland delineation products of varying resolution, age, and accuracy. The AMWI is used for preliminary assessment purposes and cannot be used to classify wetlands or characterize wetland conditions. The AMWI is provided in Appendix D.

Documentation of historical imagery and a precipitation analysis was completed as part of this EIA. Historic photos were used to examine the presence of potential wetlands throughout time, provided in Appendix B (Alberta Agriculture and Forestry 2024).

Field Assessment: A field assessment during the growing season confirmed locations and delineations of wetlands. In the field, wetland features were identified, classified and delineated, following the Alberta Wetland Classification System (GOA 2015a), and the Alberta Wetland Identification and Delineation Directive (GOA 2015b). Field based wetland delineations were completed with a hand-held GPS unit.

3.4.6 Vegetation Methodology

Desktop Methodology: Alberta Conservation Information Management System (ACIMS) element occurrence data was reviewed to identify known rare plant and rare ecological community occurrences within 2 km of the proposed Project.

Field Methodology: Vegetation in the Project was assessed using a wandering meander technique (Alberta Native Plant Council [ANPC] 2012) within the areas of Project extents, both temporary workspace and work area (Figure 1.3). Plants were identified to species level where possible and vegetation communities were described using the Urban Ecological Field Guide (City of Edmonton 2015). Lichens and bryophytes were not assessed in the field.

3.4.7 Historical Resources Methodology

A desktop review of the Listing of Historic Resources was conducted for the Project Area by Turtle Island and the results are provided in Appendix E.

3.4.8 Recreational Resources Methodology

Recreational use of the land surrounding the Project Area was explored using online resources (i.e., Discover YEG) and is well understood by the City of Edmonton.

3.4.9 Visual Resources Methodology

Existing viewscapes and sightlines were documented by the ISL field biologists through a qualitative description of views observed on and surrounding the bridge.

3.5 Impact Analysis Methods

The analysis of the Project includes consideration of relevant mitigation measures, as only the effects that remain after mitigation can be potentially of significance. Mitigation is the avoidance, reduction, or control of the Project's adverse environmental effects. The following mitigation measures are applied in a tiered approach:

- **Avoidance**: measures taken to avoid creating potential effects from the outset, such as considering spatial or temporary factors in Project planning. These measures are taken to avoid potential effects on VECs.
- **Minimization**: measures taken to reduce the duration, intensity, and/or extent of potential effects that cannot be completely avoided, as far as feasible.
- **Restoration**: measures taken in response to potential residual effects where these effects cannot be completely avoided and/or minimized.
- **Offset/Engineered**: measures taken to offset for any residual significant, adverse impacts that cannot be avoided, minimized, and/or restored.

3.5.1 Significance of Effects

Residual effects of the Project were evaluated after mitigation was applied for nature of impact, magnitude, duration, extent and likelihood, which were used to determine the potential environmental consequences associated with the Project. Table 3.2 describes the residual effects rating criteria:

Table 3.2: Residual Effects Rating Criteria Definitions

Criteria	Definition	Rating	Definition
Nature of Effect	Is the effect directly caused by the Project	Direct	Project effect results in a direct change or loss of VEC.
		Indirect	Project effect results in an indirect change or loss of VEC, such as a downstream effect.
Magnitude	A measure of how adverse or beneficial an effect may be.	Low	Project effect could result in slight decline of the VEC. Example: Project will alter common or provincially rare landscape, community, or species distributions, but will not reduce landscape community, or species diversity.
		Moderate	Project effect could result in decline of the VEC to lower than baseline. Example: Project will reduce landscape, community, or species distributions, including local loss of provincially rare species or community, or alteration of nationally rare species or communities.
		High	Potential effect could threaten viability of the VEC and should be considered a management concern. Example: Project will result in loss of nationally rare species or communities, or regional loss of provincially of provincially rare species or communities.
Duration	The period of time in which an effect on a VEC may exist or remain detectable (i.e., the recovery time for a resource, species or human use).	Short Term	Less than one year.
		Medium Term	More than one year, but less than 30 years.
		Long Term	More than 30 years.
		Permanent	Permanent effect
Extent	The spatial boundaries within which an effect of a defined magnitude occurs.	Restricted	Effect is limited to the Project footprint.
		Local	Effect extends beyond the Project footprint, but not beyond the vicinity of the Project (i.e. LSA).
		Regional	Effect extends beyond the Project vicinity (i.e., 5 km).
Likelihood	The level of certainty of the effect occurring.	Predictable	Likelihood of effects occurring are based on clear understanding of cause and effect relationships and data.
		Uncertain	Likelihood of effects occurring are based on incomplete understanding of cause and effect relationships and incomplete data.

The magnitude, duration, and extent of the negative effects are then considered to determine the significance of the residual effect as outlined below. The nature and likelihood of the effect is conservatively not considered in the significance determination as a direct or indirect rating results in an effect regardless, and the certainty of the likelihood of occurrence will be predictable to result in an effect. It should be emphasized that a residual effect can be minimal and not be considered significant, and therefore acceptable.

Low: Project effects are considered to result in minimal or negligible impacts to the environmental elements **(i.e., Non-Significant).**

Medium: Project effects will result in moderate impacts to environmental elements such as removal of a small portion of vegetation within a large area of environmentally significant land **(i.e., Non-Significant)**

Significant: Project effects result in severe alteration to the environmental elements, such as re-contouring of an escarpment, open cut operation for deep utility installation through a ravine or wetland, or loss of critical habitat for species at risk wildlife.

The ranking of effects (*i.e.*, significances) is summarized in Table 3.3.

Table 3.3: Summary of Significance Ranking Effects

Magnitude	Duration	Extent		
		Restricted	Local	Regional
Low	Short term	Low	Low	Medium
	Medium term	Medium	Medium	Medium
	Long term/Permanent	Medium	Medium	**Significant**
Moderate or High	Short term	Low	Medium	Medium
	Medium term	Medium	Medium	Medium
	Long term/Permanent	Medium	**Significant**	**Significant**

4.0
Existing Conditions

4.1 Geology, Slope Stability, Soils

4.1.1 Thurber Geotechnical Investigation Results

A Geotechnical Investigation was conducted for the Project by Thurber Engineering Ltd. (Thurber 2024). The report is summarized in this section for consideration within this EIA.

The site exhibits a complex subsurface profile characterized by a sequence of layers that include asphalt, fill materials, clay, and clay till, with interspersed sand layers, reflecting a typical Northern Alberta geology influenced by glacial and post-glacial processes.

The asphalt layer, found at the very top, varies in thickness across the site, indicating recent human modifications to the landscape. This layer is underlain by fill materials, which consist of gravel and clay. The gravel fill, likely used as a granular base course, is indicative of construction practices aiming to stabilize the ground for support structures. The clay fill, encountered below the gravel or directly beneath the asphalt in some areas, includes organic-rich silty and sandy clays. The organic content and variable quality of the clay fill suggest that it might not provide a stable foundation without remediation, such as excavation and replacement with engineered fill materials.

Beneath the fill materials, natural clay layers extend to various depths. This clay is primarily brown, silty, and contains trace amounts of sand, gravel, and oxides, reflecting the depositional environments influenced by the region's glacial history. The clay demonstrates firm to stiff consistency, with a high plasticity index in some samples, indicative of the material's potential to undergo significant volumetric changes with moisture content variations.

Deeper still, clay till constitutes a significant portion of the subsurface. This till is a dense, compact mixture of clay, silt, sand, and gravel, directly deposited by glacial action. It shows stiff to very stiff consistency, with sand layers and rafted clay shale layers within, suggesting a dynamic and varied glacial environment. The presence of rafted bedrock fragments within the till further complicates the geotechnical considerations, as these can have different strength and stiffness properties compared to the surrounding till.

The groundwater conditions identified through the investigation reveal that the subsurface is subject to the presence of groundwater, with levels varying seasonally and influenced by precipitation and the creek's hydrology. The saturated conditions within the sand layers encountered in the till and the recorded groundwater seepage during drilling necessitate careful consideration in the design and construction phases, especially regarding dewatering and the foundation's interaction with groundwater.

Study Recommendations

The following recommendations were developed by Thurber in their geotechnical report:

- **Excavation and Replacement of Organic Clay Fill:** To mitigate the variable quality and high organic content of the near-surface clay fill, it is advised to excavate and replace at least the upper 1 meter of this material with compacted inorganic fill. This action aims to enhance road performance near the new bridge approaches.
- **Use of Driven Steel H Piles:** Given the soil composition and characteristics, driven steel H piles are recommended for the bridge foundation. These piles should be designed and installed according to specific guidelines that account for the site’s geotechnical conditions, ensuring they can support the required loads.

4.1.2 Potential Soil Contamination

As part of Thurber's geotechnical program, they also completed a Limited Phase II Environmental Site Assessment to determine potential soil contamination at the Project Area, of which is summarized below.

Field Investigation: Environmental soil samples were collected from November 20 to 21, 2023, during the geotechnical investigation program. Samples were taken from various depths (approximately 0.75 m to up to 6.0 m below ground surface) and locations around the project site, focusing on areas where different soil materials intersected, or where staining or odors indicated potential contamination. Samples were analyzed for hydrocarbons, metals, and salinity parameters.

Results:

The analysis compared results to the 2022 Alberta Tier 1 Soil and Groundwater Remediation Guidelines for fine-grained soils under commercial and residential land use criteria. The samples met the guidelines for hydrocarbon and metals parameters. Elevated levels of Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR) were found in samples from test holes TH23-01 and TH23-02, which could partly be associated with road salt application and potentially naturally occurring elevated sulphate and sodium in the area's shallow soils. A composite sample indicated the soil would be suitable for Class 2 (non-hazardous) disposal.

Recommendations for Construction

The following recommendations were developed by Thurber in their Limited Phase II report:

Upper 1 Meter of Excavated Soil: Given the elevated chloride in the shallow sample from TH23-02, the top 1 meter of excavated soil should be considered potentially impacted and may require additional characterization for reuse. Otherwise, it may be more efficient to dispose of this soil at a Class 2 landfill, pending landfill approval and potentially a new landfill suitability sample if required by the landfill operator.

Deeper Soils with Naturally Elevated EC/SAR: These soils could be reused within the project scope; however, they are not suitable for unrestricted use due to exceeding the Tier 1 Residential guidelines. Excess soil volumes generated might need disposal at a landfill.

4.2 Hydrology and Surface Drainage

The hydraulic assessment for the replacement of the bridge was conducted by ISL's hydrotechnical engineering team and involved a comprehensive analysis aimed at understanding the hydraulic impacts of the proposed bridge structures compared to the existing bridge. The results of the hydrotechnical report are summarized below.

Investigation:

- **Hydraulic Model Construction:** A 2D hydraulic model was developed to analyze flood flow impacts at the bridge crossing, assessing water surface elevations, depths, and velocities along a 1.5 km stretch of Horsehills Creek, extending from 500 m upstream to 1,000 m downstream of the bridge.
- **Bridge Design Assessment:** Three initial bridge replacement options were considered, focusing on current and future needs, environmental impacts, and cost-effectiveness. The study focused on two girder bridge options after excluding the box culvert option early in the review process due to site criteria constraints.
- **Data Collection:** Topographic and bathymetric data were sourced from Natural Resources Canada and detailed cross-sections along Horsehills Creek. The hydrology data was derived from a 2021 ISL study, providing updated flood flows based on recent rainfall records and hydrographs calibrated against flow monitoring data.

Results:

- **Hydrology Data:** The updated hydrology study indicated that flood flows in Horsehills Creek have nearly doubled over the last decade. The peak flows for 1:50-year and 1:100-year events were estimated at 27.3 m^3/s and 41.6 m^3/s, respectively, showcasing a significant increase from previous assessments.
- **Modeling Results:** The assessment showed that replacing the bridge with the proposed SLC girder type, featuring a flat vertical backwall abutment, marginally lowers water surface elevations (WSE), offering slight improvements over the existing structure. Both proposed replacement options (SLC and SLW girder types) were found to have an insignificant impact on WSE and downstream watercourse crossings compared to the existing bridge.

4.3 Fish and Fish Habitat

4.3.1 Desktop Assessment

Fish Inventory

A search of the FWMIT database reported a non-sportfish species occurrence historically found within the Study Area, provided in Table 4.1. The FWMIT report is provided in the supplemental Wildlife data, Appendix F.

Table 4.1: Wildlife Species with Historical Occurrences in the 2 km Study Area

Common Name	Scientific Name	Provincial Status[1]	COSEWIC Status[2]
Fathead Minnow	*Pimephales promelas*	Secure	Not listed

1. Listing on Alberta General Status - 2020 (GOA 2024a).
2. SARA Species Status Search (GOC 2022, COSEWIC 2020)

Watershed

The Horsehill Creek watershed is located near Edmonton, Alberta, in Canada. It drains into the North Saskatchewan River, a major waterway flowing eastward across the provinces of Alberta and Saskatchewan. The creek provides essential habitats for various fish species, particularly in its lower reaches above its confluence with the North Saskatchewan River, including sportfish like pike and walleye. The watershed encompasses a mix of agricultural, residential, and industrial lands, contributing to the diverse aquatic life and overall ecological health of the North Saskatchewan River. This is reflected by the creek being part of the River Valley Bylaw area.

4.3.2 Field Assessment

Field photographs are provided in Appendix G and the general reach information is provided below.

Bankfull channel widths ranged from 0.3 m to 3 m, with an average width of 1.2 m. Water levels ranged from 0.2 m to 1.0 m in depth below the bridge. The reach is entirely vegetated with grasses and forbs with willows species and aspen providing moderate overhead cover. Substrates throughout the reach consisted mostly of fines and organics (Photo Plate #18). Upstream of the bridge, the creek is confined between a farmer's field and the ditch of 18 Street, before it becomes less defined (Photo Plate #16). An unnamed drainage joins Horsehill Creek immediately upstream of the bridge (Photo Plate #14). Significant human disturbance, including channel dredging, has occurred downstream of the bridge within the adjacent property (Photo Plates #21-22) outside of the Project Area, and the creek becomes larger in width towards Highway 15, as it has been straightened in the past.

The Environmental Quality Guidelines for Alberta Surface Waters (GOA 2014) guideline for the protection of aquatic life for pH ranges from 6.5 to 9.0, while dissolved oxygen ranges from 6.5 mg/L to 9.5 mg/L. The water temperature at the time of the assessment was 4 ºC, the pH was 8.5, with 12.1 mg/L of dissolved oxygen and 1054 µS/cm of electrical conductivity, and therefore met all guidelines. The creek was considered non-turbid during the assessment.

Habitat ratings for the study area were considered "Good" for spawning, rearing, feeding for non-sportfish. The migration potential does not include the lack of migration from the North Saskatchewan River. No sportfish habitat ratings are given, as they are not present or expected at this area of Horsehill Creek.

Fish Habitat Mapping

No habitat mapping was completed for the Project Area, as the entirety of the assessed reach was of similar habitat, namely deep flats.Habitat mapping was completed as part of the field assessment for the studied reach of Horsehills Creek to determine the variety and extent of habitat units available in the creek for fish and fish habitat.

4.4 Wildlife and Wildlife Habitat

4.4.1 Desktop Assessment Results

The search of species occurrence history within the Project Area was conducted in January 2023; the results are provided in Table 4.2. Their conservation statuses were determined using the *Alberta Wild Species General Status Listing - 2020* (GOA 2024a), the *Alberta Wildlife Act* (AWA) (GOA 2000, GOA 2023), and the *Species at Risk Act* (SARA) (GOC 2022), available for review in Appendix F.

Table 4.2: FWIMT Search Results for Terrestrial Wildlife

Common Name	Scientific Name	SARA[1]	Alberta Wildlife Act[2]	GSAWS[3]
Barn swallow	*Hirundo rustica*	Not Listed	Not Listed	Special Concern
Eastern Kingbird	*Tyrannus tyrannus*	Not Listed	Not Listed	Not Listed
Fisher	*Martes pennanti*	Not Listed	Not Listed	Sensitive
Great Blue Heron	*Ardea herodias*	Not Listed	Not Listed	Not Listed
Least Flycatcher	*Empidonax minimus*	Not Listed	Not Listed	Not Listed
Sandhill Crane	*Grus canadensis*	Not Listed	Not Listed	Not Listed
Sora	Porzana carolina	Not Listed	Not Listed	Not Listed

Notes:
1. SARA – Species At Risk Act (GOC 2022).
2. AWA – Alberta Wildlife Act (GOA 2000, GOA 2023).
3. GSAWS – General Status of Alberta Wild Species – 2020 (GOA 2024a).

Based on desktop and field data combined with known habitat requirements and distributional ranges, a list of seven vertebrate Wildlife Species was compiled. These species have the potential to occur within the Project 2km Study Area and spend some portion of their life cycle as resident, breeding, or overwintering. These species are listed in Appendix F and include no reptiles, no amphibians, six birds, and one mammal species. Additionally, the Project intersects with the bald-eagle and the sharp-tailed grouse sensitive ranges.

4.4.2 Field Survey Results

Winter Tracking Survey

During the survey, a snow-mat was identified approximately 75 m southeast of the 18 Street NW bridge (Figure 4.4). A snow mat is characterized by "so many tracks over an area that it is impossible to guess as to the numbers, or how many times they passed, or even to count trails" (Bayne et al. 2005). This suggests the presence of a well-used wildlife or game trail. While it was challenging to clearly identify deer species tracks in the snow mat, they were discernable. Notably, one deer track was observed under the 18 Street NW bridge. However, the track indicated that the deer walked along the creek bed and turned to cross over the road, instead of passing under the bridge. No additional incidental species were observed during the winter track survey or habitat assessments.

Table 4.3: Winter Track Survey Results

Species	Scientific Name	Track Count	Observation Type	GSAWS[2]	Alberta Wildlife Act[3]	SARA[4]
Coyote	*Canis latrans*	2	Snow track[1]	Secure	Not Listed	Not listed
Deer	*Cervus spp.*	7	Snow-track	Secure	Not Listed	Not listed
Deer mouse	*Peromycus maniculatus*	1	Snow-track	Undetermined	Not Listed	Not listed
Corvid spp.	*Corvus spp.*	1	Snow-track	Secure	Not Listed	Not listed

Notes:
1. Snow track: a single track or a number of tracks where individuals can be distinguished (Bayne et al. 2005)
2. GSAWS - General Status of Alberta Wild Species (GOA 2024).
3. AWA – Alberta Wildlife Act (GOA. 2000, GOA 2023).
4. SARA - Species At Risk Act (GOC 2022)

Breeding Bird Surveys and Habitat Assessment

Breeding bird surveys were carried out to identify the variety of bird species that might use the Project Area for nesting purposes. For the survey performed on May 5, 2024, a passive detection survey protocol was selected, considering the project's relatively small footprint. Due to the timing of the survey being on May 5, 2024, and bird behavior being present at the time, a breeding bird survey was performed from 07:30, and lasted until 10:30. Species observed are shown below in Table 4.4.

Table 4.4: Species Observed During Breeding Bird Survey (May 5, 2024)

Birds Surveyed				
Common Name	**Scientific Name**	**GSAWS[1]**	**Alberta Wildlife Act[2]**	**SARA[3]**
American Robin	*Turdus migratorius*	Secure	Not Listed	Not Listed
Black-billed magpie	*Pica hudsonia*	Secure	Not Listed	Not Listed
Black-capped chickadee	*Poecile atricapillus*	Secure	Not Listed	Not Listed
Brown-headed cowbird	*Molothrus ater*	Secure	Not Listed	Not Listed
Canada goose	*Branta canadensis*	Secure	Not Listed	Not Listed
Crow	*Corvus spp.*	Secure	Not Listed	Not Listed
European starling	*Sturnus vulgaris*	Exotic/Alien	Not Listed	Not Listed
Franklin's gull	*Leucophaeus pipixcan)*	Secure	Not Listed	Not Listed
House finch	*Haemorhous mexicanus*	Secure	Not Listed	Not Listed
Killdeer	*Charadrius vociferus*	Secure	Not Listed	Not Listed
Mallard	*Anas platyrhynchos*	Secure	Not Listed	Not Listed
Northern flicker	*Colaptes auratus*	Secure	Not Listed	Not Listed
Northern pintail	*Anas acuta*	Secure	Not Listed	Not Listed
Common Raven	*Corvus corax*	Secure	Not Listed	Not Listed
Red-tailed hawk	*Buteo jamaicensis*	Secure	Not Listed	Not at Risk
Rock pigeon	*Columba livia*	Secure	Not Listed	Not Listed
Red-winged blackbird	*Agelaius phoeniceus*	Secure	Not Listed	Not Listed

Birds Surveyed				
Common Name	**Scientific Name**	**GSAWS[1]**	**Alberta Wildlife Act[2]**	**SARA[3]**
Savannah sparrow	*Passerculus sandwichensis*	Secure	Not Listed	Not Listed
Song sparrow	*Melospiza melodia*	Secure	Not Listed	Not Listed
Tree Swallow	*Tachycineta bicolor*	Secure	Not Listed	Not Listed
White-throated sparrow	*Zonotrichia albicollis*	Secure	Not Listed	Not Listed
Wilson's snipe	*Gallinago delicata*	Secure	Not Listed	Not Listed

Notes:
1. GSAWS – General Status of Alberta Wild Species (GOA 2024).
2. AWA – Alberta Wildlife Act (GOA. 2000, GOA 2023).
3. SARA – Species At Risk Act (GOC 2022)

The nesting quality in the Project Area was determined to be of moderate to high level. The surveyed location included willow stands, both immature and mature deciduous stands with lone conifers, and areas suitable for foraging or low-nesting species (i.e., dark-eyed junco, sparrow spp.).

A barn swallow nest was found on the underside of the bridge on the north end in between two concrete support beams (Photo Plate #1). This nest seemed to be from a previous nesting season, as the nest remained intact, but did not contain remnants from recent bird activity (i.e., feathers, nesting materials, and droppings). Barn swallows are listed as May Be at Risk in Alberta, and although no barn swallows were observed during the field visit, the retired nest under the bridge suggests nesting colonies could be established in future seasons.

Due to the representative songbird habitat, as well as the potential for swallows nesting under the bridge, the Project is recommended to work outside the general nesting period from April 15 to August 31.

4.4.3 Wildlife Habitat Assessment Results

Habitat Assessment

The Project Area was assessed in winter on January 17, 2024, and in the spring on May 5, 2024. In the winter assessment, the most abundant habitat type observed included treed areas characterized by immature aspen stands, low shrubs, and disturbed grassy areas. These areas provide suitable habitats for ungulates, with adjacent habitats including coniferous and aspen forest patches, manicured grass patches such as mowed fields and lawns, and anthropogenic areas/features like buildings, bridges, roads, parking areas, and residences. The diversity of habitat types within the Project Area suggests a range of environments that can provide shelter in the winter for various wildlife populations, including ungulates and medium to small mammals.

During the spring field visit, the habitat exhibited similar characteristics to those observed during the winter survey. However, with the snow melted and the area free of snow cover, additional features of the habitat became visible. It was noted that the area contained attributes suitable for denning mammals, such undercut banks, rock crevices, and dense vegetation in wooded areas that could provide shelter and protection. Additionally, the area provides a wildlife corridor for large mammals and ungulates, shown by the presence of moose scat, and antler tree rubs within 100m of the bridge (Photo plate #2-3). the presence of snakes and amphibian features were observed, indicating suitable habitat for these animals, including areas with debris piles, sun-exposed basking sites (i.e. roads, concrete), amphibian breeding ponds and diverse vegetation for cover and foraging opportunities (Photo plate #4). Overall, the spring assessment revealed the dynamic nature of the habitat, showcasing its suitability for a variety of wildlife species, including denning and non-denning mammals, snakes, and amphibians.

Bald Eagle Habitat Assessment

The Project Area was assessed during the spring and winter field assessments to determine its potential impact on bald eagle (*Haliaeetus leucocephalus*) habitat and the likelihood of affecting individual birds or nesting sites during development. The Project Area was found to offer low-quality nesting habitat for eagles due to insufficient perching areas and a lack of tall mature trees suitable for nesting. While the habitat may serve as temporary habitat patch for bald eagles, with potential food sources such as songbirds and small mammals likely present in nearby agricultural fields, the overall long-term suitability of the habitat for this species within the Project Area and its surrounding 1 km buffer zone is limited. Consequently, bald eagles are not anticipated to be adversely affected by construction, building, or mobilization.

Winter and Spring Raptor Sticknest Survey

A survey for sensitive raptor sticknests was conducted during both winter and spring field visits. In accordance with the SSIG (AEP 2013), potential raptor nesting sites, including treed, tall shrub, and cliff sites (i.e tall structures), were investigated for stick nests, raptor sign, or important habitat features. Raptor sign includes pellets, plucking posts, and associated remains. Important habitat features, in addition to existing stick nests, included large cavities, mature (dead or living) deciduous, and large standalone conifer trees.

The site provided moderate habitat for nesting raptors and owls, though there were few trees large enough to support a nest. However, the area did serve as a potential feeding ground, with suitable habitat for songbirds, small mammals, and colonies of Richardson's ground squirrels, which were heard calling nearby. During the raptor nest survey, a red-tailed hawk was observed flying overhead.

Two sticknests were found approximately 200m SE of Horsehills bridge (Photo Plate #5) but appeared to be constructed by magpies in a previous year and did not appear to be active. Magpies are not protected under the *Wildlife Act*, so no mitigation is required for these nests. No raptor nests were found within 1 km of the Project Area during the winter or spring surveys, and no defensive or territorial behaviors were noted during the spring survey.

Due to the presence of representative raptor habitat, and a raptor species observed during the spring survey, it is recommended any construction around 18 St over Horsehills Creek occurs outside the sensitive raptor breeding period of for sensitive raptors, which includes the bald eagle. The Project is recommended to observe a general nesting period from March 15 to August 31, with consideration given to owls and raptors that might nest outside of this timeframe (e.g., great-horned owl [*Bubo virginianus*]). As mentioned in the MCBA discussion above, active nests (used within the past 3 years) are protected throughout the year. Nest sweeps should be conducted before the onset of construction, as outlined in the MCBA. Setback distances, if deemed necessary and feasible, will be determined following nest sweeps and consultation with ECCC.

Sharp-tailed grouse Survey

A Sharp-tailed grouse survey and habitat assessment was performed on May 5, 2024 at 07:30. Sharp-tailed grouse habitat did not appear to exist within the Project Area or in any immediate buffers or within a 1-km buffer. The surrounding area was observed to be dominated by agricultural land, tame pasture, anthropogenic structures, and overtop of 18 St NW. All potential areas within fields of agricultural land within 500 m of the bridge were surveyed on foot, and while using binoculars, as shown in the surveyed area on Figure 3.1. No grouse were flushed, observed, or heard during the grouse surveys. Due to the lack of available habitat and preexisting habitat fragmentation caused by human developments, Sharp-tail grouse are not expected to be impacted by the Project.

If construction and work being completed at the bridge occurs from March 15 - June 15 (medium and low impact), sharp-tailed grouse should be considered during the pre-disturbance survey, and if lekking behaviour is observed (i.e. dancing, singing, etc.) or a lek is identified, the acting wildlife biologist should enforce a buffer following consultation with an AEP biologist.

Bat Roosting Potential

The Project Area was assessed to determine bat roosting potential during the winter and spring surveys. While no standalone dead trees suitable for bat roosting were observed onsite, feeding areas conducive to temporary habitat utilization for bats were identified. Additionally, buildings and anthropogenic structures in proximity to the 18 St Bridge and Horsehills Creek could serve as roosting areas for bats, benefiting from increased insect activity during dusk or twilight hours. Overall, the Project Area was considered to offer moderate habitat for bat species. Construction activities are unlikely to impact bats if conducted in late fall or winter when bats are not present in the Project Area.

Ground Nesting Birds

Tall grass in adjacent ditches and the edges of agricultural land did not provide suitable habitat for ground nesting birds, due to heavy anthropogenic influence, and agricultural practices in adjacent farmlands, available habitat for ground nesting birds is limited on the site and surrounding buffers. Ground nesting birds are unlikely to be impacted by the Project; however, they still have potential to occur during the migratory bird nesting period (April 15 to August 31).

Snake Hibernaculum

Suitability for snake hibernaculum was assessed during the spring survey. The site provided sufficient basking areas (concrete roadways, gravel) but provided limited areas for hibernaculum potential due to flooding potential from Horsehills Creek. Some features in the Project Area could be used as temporary habitat or basking areas for snakes (i.e., concrete bridge decking, cracks and fissures caused by bridge settling), but limited to no potential exists for snake hibernaculum due to the lack of rock outcroppings and fluctuating water levels within the Project Area. Snakes and snake hibernaculum are not anticipated to be impacted by the bridge replacement; however, if a snake hibernaculum is encountered during pre-construction wildlife sweeps, additional mitigation measures to protect snakes (i.e., silt fencing, redesignation of parking areas) may be applied to the site.

Potential for Mammals and Mammal Denning Sites

The area surrounding the bridge was examined for potential denning sites for the fisher, a species of concern noted in the FWMIT search (Table 4.2) and classified as "Sensitive" in Alberta. The survey indicated moderate to low potential for the presence of fisher or other medium-sized denning mammals. While wooded areas within 150 meters of the bridge could offer denning habitat, the banks along Horsehills Creek did not provide suitable habitat for small to medium-sized mammals due to densely packed rocks, rocky substrate, and fluctuating water levels. However, generalist species, such as mice, Richardson's ground squirrels, and other small mammals, may inhabit the area in its altered state. Since these species are not protected under the *Wildlife Act*, no mitigation measures are necessary for these denning areas if encountered.

Various mammalian sign was observed during the spring survey. The results of incidental observations are listed below in Table 4.5.

Table 4.5: Incidental Mammalian Species Encountered on Spring Assessment (May 5, 2024)

Species	Scientific Name	Observation Type	GSAWS[1]	Alberta Wildlife Act[2]	SARA[3]
Cottontail rabbit	*Sylvilagus floridanus*	Track	Secure	Not Listed	Not Listed
Coyote	*Canis latrans*	Track	Secure	Not Listed	Not listed
Deer	*Cervus spp.*	Track	Secure	Not Listed	Not listed
Deer mouse	*Peromycus maniculatus*	Track	Undetermined	Not Listed	Not listed
Moose	*Alces alces*	Track/scat	Secure	Not Listed	Not listed
Richardson's ground squirrel	*Urocitellus richardsonii*	Auditory/visual	Secure	Not Listed	Not Listed
Snowshoe hare	*Lepus americanus*	Visual	Secure	Not Listed	Not Listed

Notes:
1. GSAWS – General Status of Alberta Wild Species (GOA 2024).
2. AWA – Alberta Wildlife Act (GOA. 2000, GOA 2023).
3. SARA – Species At Risk Act (GOC 2022)

Amphibian Habitat Assessment

The site offered moderately suitable habitat and breeding habitat for amphibians. During the site assessment on May 5, 2024, boreal chorus frogs were heard calling throughout the area. Depressions (i.e., ditches, low areas, riparian areas etc.) in the landscape were observed and would likely hold pockets of pooled water and provide breeding habitat for sensitive amphibian species, which require standing water to breed (shown in Photo Plate #6). Construction activities should be scheduled outside the sensitive amphibian breeding time for amphibians (late April to early June) if possible.

4.4.4 Wildlife Corridors and Connectivity

The Project Area is recognized as locally significant for wildlife movement. However, on a regional scale, extensive fragmentation resulting from urban residential and industrial development has effectively impeded regional wildlife movement, particularly in terms of connectivity with the North Saskatchewan River Valley. It is likely that medium to large mammals commonly found in the city, such as deer, moose, and coyotes, utilize the Horsehills Creek corridor to access adjacent habitats or anthropogenic natural areas like golf courses when available. The bridge structure lacks sufficient height to facilitate wildlife passage for most large mammals, such as deer and moose. However, medium-sized species like coyotes or fishers might pass under the bridge during periods of low or frozen water levels, while larger mammals may cross over 18 Street, as discussed in the winter track survey results.

Further anthropogenic influences aside from permanent structures and the ongoing construction of infrastructure that could affect movement patterns of wildlife include: traffic noise, light pollution, human, and domesticated animal presence. These developments and associated anthropogenic influences have significantly impacted the Project Area's ability to function as a viable wildlife corridor. Most wildlife species effectively utilize this landscape as temporary habitat, with permanent residents being resilient generalist species such as: coyote, Richardson's ground squirrels, gray squirrels, mule deer and white-tailed deer. Due to the historical context of the developments surrounding the Project Area, further increases in development are not expected to cause significant effects.

4.5 Wetlands

Desktop Review Results

A desktop review of the potential watercourse fringe wetland was completed via an examination over time in available satellite imagery and select historical photographs (Appendix B). A precipitation analysis for the photography and imagery dates is provided in Table 4.6 below. A map of the Alberta Merged Wetland Inventory (AMWI) is provided in Appendix D.

Table 4.6: Precipitation Analysis

Air Photo Date[1,2] (Season)	Air Photo ID Roll; Photo	Scale	Annual Precipitation[3]	Monthly Precipitation[3]	Daily Precipitation[3]
1949	AS 133	1:40,000	--	--	--
13-Nov-1960 (Winter)	AS 3279	1:12,000	Above Average	Average (<6 mm within two weeks)	1.3 mm
28-Sept-1976 (Fall)	AS 1547	1:20,000	Above Average	Average (<6 mm within 2 weeks)	0 mm
2-July-1978 (Summer)	AS 1609	1:10,000	Above Average	Above Average (< 25 mm within two weeks)	0 mm
14-June-1984 (Summer)	AS 3247	1:20,000	Approximately Average	Slightly Above Average (almost 80 mm 2 weeks prior)	2.55 mm
24-July-1987 (Summer)	AS 3607	1:30,000	Approximately Average	Above Average (< 24 mm within 2 weeks)	0 mm
23-April-1988 (Spring)	AS 3691	1:10,000	Above Average	Average (< 3mm within 2 weeks)	0 mm
29-April-2001 (Spring)	ED 2001-02	1:20,000	Below Average	Below Average (< 2 mm within 2 weeks)	0.55 mm
15-May-2006 (Spring)	AS 5369BB	1:20,000	Approximately Average	Average (<20 mm in two weeks prior)	0 mm
5-July-2007 (Summer)	ED 2007-01	1:20,000	Below Average	Below Average (<22mm within two weeks)	0 mm
1949	AS 133	1:40,000	--	--	--

Notes:
1. Where collection date is available.
2. All aerial imagery sourced from AEP's Aerial Photo Record System (APRS) (GOA 2024b)
3. All historical precipitation data from (Alberta Agriculture and Forestry 2024)

Wetland Field Results

Wetland Delineation

Wetland Pathways: Pathway 3 was used to delineate the wetland; simple desktop with field verification. Good quality imagery was available and the boundary relatively obvious. The boundary was field verified within the road right-of-way while outside of it a desktop delineation (Pathway 1) was completed.

Wetland Classification

Wetland classification information is provided in Table 4.7 below.

Wetland Vegetation and Hydrologic Characteristics

Wetland vegetation and hydrological information is provided in Tables 4.8 and 4.9 below.

Table 4.7: Information and Evidence Used to Classify Wetlands

Wetland ID	Alberta Wetland Classification System	Soil Characteristics	Hydrologic Characteristics	Vegetation Characteristics[1]	Most Abundant Indicator Species[2]	ABWRET-A Valuation/ Qualitative Habitat Description[3]	Photoplates (Appendix G)
1	M-G-III (Seasonal Marsh)	Soil frozen at 17 cm depth (May 15, 2024) Gley: 10Y/R 4/1 Matrix: 10YR 3/1 Gleying evident at 13 cm depth Sulfidic odour in soils	Water present in creek. Soils frozen at 15 cm depth.	Dominated by reed canary grass with occasional willow, sedge and cattail	Reed canary grass	ABWRET-A: C Qualitative Description: High (wetland habitat types are always ranked high)	7-12

Notes:
1. From the Alberta Wetland Classification System (ESRD 2015)
2. As defined in Alberta Wetland Plant Indicator Species List (Alberta Native Plant Council 2021).
3. This is a qualitative, opinion-based ranking between the wetlands themselves and the authors professional experience in the region. Use of the more objective quantitative based ABWRET-A valuation is recommend for a comparative assessment.

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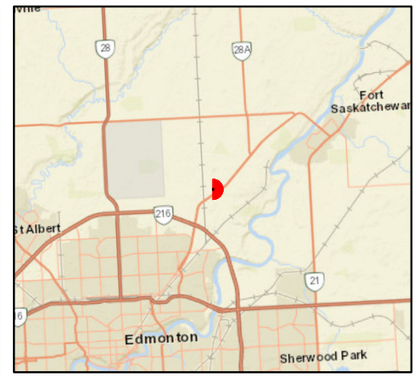

LEGEND

- Grading Limits
- Project Area
- Wetland Disturbance Area
- Wetland

TITLE

WETLAND FIELD DELINEATION MAP

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

0 0.025 0.05 0.1 KM

1:3,569

FIGURE	4.1
DATE	2024-05-24
PROJECT NO.	16547
AUTHOR	RG

740000

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Enviro\16447_Figure_4.2_WetlandOverview.mxd

Note: Delineations outside of the road right of way, are desktop delineated due to lack of land access permissions.

Table 4.8: Wetland Boundary Information Table

Wetland Number	Vegetation Community Name	Plot Technique	Plot Location (UTM) (Zone 12U)[3]	Stratum (Ground, Shrub, Tree)	Common Name	Latin Name	Alberta Wetland Species[1]	Percent Relative Cover of Abundant Species (Rounded to the nearest 5)[4]
1	Temporary marsh and upland deciduous forested / roadside	1 m x 1 m	343479 E/ 5948379N	Ground	reed canary grass	*Phalaris arundinacea*	FACW	45
					Sedge species	*Carex Sp.*	OBL	5
					Smooth brome	*Bromus inermis*	UPL	30
					fowl bluegrass	*Poa palustris*	FACW	10
					balsam poplar	*Populus balsamifera*	FACW	5
					common dandelion	*Taraxacum officinale*	FACU	5
					perennial sow-thistle	*Sonchus arvensis*	FAC	5
					snowberry	*Symphoricarpos albus*	UPL	5
							Wet/Non-wet	**65:45**

Notes:
1. As defined in Alberta Native Plant Council Wetland Species List (ANPC 2021)
   Obligate (OBL) – almost always a hydrophyte, rarely in uplands
   Facultative Wetland (FACW) – usually a hydrophyte, occasionally found in uplands
   Facultative (FAC) – commonly occurs as either a hydrophyte or nonhydrophyte
   Facultative Upland (FACU) – Occasionally is a hydrophyte, usually occurs in uplands
2. Assessment of representative vegetation via 1x1 plots and purposeful meander on foot along wetland boundary of project footprint.
3. Cover may be less than 100% due to bare ground or thatch.

Table 4.9: Field Indicators for Wetland Identification and Delineation

Wetland Number	Wetland Class Code (Vegetation Community Name)	Plot Technique	Plot Location (UTM) (Zone 12U)	Stratum (Ground, Shrub, Tree)	Common Name	Latin Name	Wetland Species[1]	Percent Relative Cover of Abundant Species (Rounded to the nearest 5)
1	Seasonal Graminoid Marsh (M-G-III)	1m x 1m	343480E/ 5948400N	Ground	reed canary grass	*Phalaris arundinacea*	FACW	100

Notes:

1. As defined in the Alberta Wetland Plant Indicator List (ANPC 2021). Great Plains Regions results listed.
   OBL: Obligate (almost always a hydrophyte, rarely in uplands)
   FACW: Facultative Wetland (usually a hydrophyte, occasionally found in uplands)
   FAC: Facultative (commonly occurs as either a hydrophyte or nonhydrophyte)
   FACU: Facultative Upland (Occasionally is a hydrophyte, usually occurs in uplands)
2. Assessment of representative vegetation via purposeful meander on foot and 1x1 plots.
3. May not add to 100 due to surface water, bare ground or thatch

Wetland Impacts

Areas of wetland impact are provided in Table 4.10 below.

Table 4.10: Wetland Areas of Impact

Wetland	Area (ha) of Entire Wetland	Area of Wetland Impact (ha)	Percentage of Wetland Impacted	Area of Wetland Remaining (ha)
1	14.45 ha	0.10 ha	0.7%	14.35 ha

4.6 Vegetation

Results

Observed Species

A field vegetation assessment was conducted on May 15, 2024; however, many species were observed to be still in winter dormancy and a supplemental field assessment was conducted on July 4, 2024. A list of observed species is provided in Appendix H.

Observed Weeds

There were five Noxious weed species observed (Canada thistle, perennial sow-thistle, yellow toadflax, common tansy, and field scabious) during the May and July 2024 field assessment; see Appendix H for a list of all weed species at the Project.

Rare Plants

No previous occurrences of rare ACIMS species occurrences have been recorded in a 2 km search area radius of the Project. The output from ACIMS and a table of rare vascular plant species known to be in the Central Parkland Natural Subregion are provided in Appendix H.

No rare vascular plants were observed during either the May or July 2024 field assessments. The wetland area at Horsehills Creek is considered to be moderate potential rare plant habitat however the near monoculture and thick thatch of reed canary grass is a likely factor in the lack of observed rare plants and low biodiversity of the area in general. The roadside and treed habitats elsewhere on the Project are considered low rare plant potential.

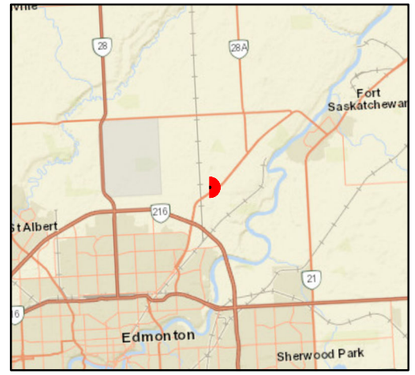
Primary Land and Vegetation Inventory

A map of Primary Land and Vegetation Inventory (uPLVI) within the LSA is depicted in Figure 4.2.

740000

Natural
Modified
Natural
Modified
Naturally Wooded
Modified
Developed
Modified
Modified
Naturally Non-wooded
Naturally Non-wooded
Wetland
Natural
Naturally Non-wooded
Wetland
Modified
Modified
Modified
Modified
Modified

N



LEGEND

Bridge Replacement

Primary Land and Vegetation Inventory

- Developed
- Modified
- Natural
- Naturally Non-wooded
- Naturally Wooded
- Wetland

TITLE

PRIMARY LAND AND VEGETATION INVENTORY (UPLVI)

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

0 0.01 0.02 0.04
1:1,500 KM

FIGURE	4.2
DATE	2024-03-22
PROJECT NO.	16547
AUTHOR	RG

740000

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Vegetation Communities

Vegetation communities at the Project was keyed as per the Urban Ecological Field Guide (City of Edmonton 2015), described in Table 4.11 below. The uPLVI dataset (Figure 4.2), shows the primary canopy species polygons (City of Edmonton 2016).

Table 4.11: Vegetation Communities in Study Area

Vegetation Community Code[3]	Location	Typical Tree Species	Typical Shrub Species[1,2]	Typical Understory Species (Forbs, Grasses)
NF13 Non-Forest/ Reed canary grass	At Horsehill Creek Bridge over 18 Street	n/a	Yellow willow, high bush-cranberry, red-osier dogwood, beaked willow, beaked hazelnut, wild red raspberry	Reed canary-grass, Canada thistle, ostrich fern, common dandelion, purple stemmed aster, large leaved avens

Notes:
1. Common name is as per Urban Ecological Field Guide (City of Edmonton 2015).
2. Species with typical percent cover of 1% or less are excluded from this table for brevity.
3. Species assemblages listed are as described in the Urban Ecological Field Guide (City of Edmonton 2015).

ACIMS Element Data

ACIMS element occurrence data was reviewed to identify known rare plant and rare ecological community occurrences in the 2km Study Area of the Project. No historical ACIMS occurrences are within this 2 km Study Area. Rare vascular plant species and rare ecological communities known to occur within the Central Parkland Natural Subregion are provided in Appendix H.

Environmentally Significant Areas

The probability for Environmentally Significant Areas was assessed by examining the Environmentally Significant Areas in Alberta: 2014 Update Report (Fiera 2014), as well as the corresponding spatial data.

To qualify as a provincial Environmentally Significant Area, areas must exceed the criteria sum of 0.189 (Fiera 2014). No provincial environmentally significant areas are located in the 2 km Study Area; see Figure 4.3 on the following page.

740000

LSD 8 QS SE Sec 18 Twp 54 Rge 23 W4M

LSD 5 QS SW Sec 17 Twp 54 Rge 23 W4M

0.1472

0.1024

LSD 1 QS SE Sec 18 Twp 54 Rge 23 W4M

LSD 4 QS SW Sec 17 Twp 54 Rge 23 W4M

N

740000

LEGEND

ESA_CompleteForProvince_AllQS

ESA_SUM

- >0.189 = Darkest Brown = ESA
- 0.147 - 0.189
- 0.108 - 0.147
- 0.074 - 0.108
- 0.041 - 0.074
- 0.001 - 0.041
- Bridge Replacement

TITLE

ENVIRONMENTALLY SIGNIFICANT AREAS

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

0 0.005 0.01 0.02

1:1,000 KM

FIGURE	4.3
DATE	2024-03-22
PROJECT NO.	16547
AUTHOR	RG

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Enviro\16447_Figure_ESAs.mxd

4.7 Historical Resources

Preliminary investigations for historical cultural resources have been conducted by Turtle Island for the purposes of submitting an Historical Resources Act Clearance Application to Alberta Arts, Culture and Status of Women and are summarized below.

4.7.1 Archaeology Review:

The bridge development site is described as level terrain spanning Horsehill Creek, an area impacted by historical and contemporary cultivation and infrastructure like the 18 Street right-of-way berm and adjacent high tension power lines. The creek itself is small and meandering, with no significant valley or relic terraces at the bridge crossing, leading to poorly drained areas associated with the creek channel. The foundation will rely on driven steel piles, minimizing significant excavation and limiting impacts on potentially culturally significant sediments. Given these considerations and the general site observations, Turtle Island assesses that the likelihood of encountering significant, previously unrecorded cultural resource sites within the Project Area is minimal. Consequently, they recommend a Section 31 Clearance for the project, indicating that complex archaeological work, including field assessments, is not warranted for this bridge replacement.

4.7.2 Paleontological Review

No paleontological HRVs have been assigned to the project locality. The letter notes that bedrock at the site consists of the Late Cretaceous Horseshoe Canyon Formation, which is known to be locally fossiliferous but is not expected to be impacted due to the shallow nature of the construction. The surficial cover is mapped as glaciolacustrine sand and silt, with occasional gravel, indicating low paleontological potential for significant fossil resources. The letter compares the project site to nearby Quaternary HRV 4 sites, which are associated with fluvial sand and gravel deposits in incised watercourses, unlike the Project location. Based on the analysis of the site's geological context and the construction methods to be employed, it is recommended that no further paleontological work is required for the 18 Street over Horsehills Creek Bridge Replacement project. This recommendation is supported by the observation that the planned construction excavation will occur at shallow depths in sediments with low paleontological potential, and the use of driven steel piles will not significantly disturb subsurface material.

4.7.3 Summary

No additional historical work is recommended for the Project and a Historical Resources Clearance has been recommended for the Project. A copy of the complete Historical Resources Clearance Application including the discussion of Historical Resources in the Project Area as prepared by Turtle Island, as well as the Paleontological Statement of Justification as prepared by Steppe, is included in Appendix E.

4.8 Recreational Resources

The current recreational use of 18 Street and the bridge over Horsehills Creek is most likely limited to gravel road cycling enthusiasts and local walkers. Situated approximately 2 km to the southeast, Horse Hill School is likely the core area for recreational activities in the local community. This educational institution provides various recreational amenities, including playgrounds and soccer fields. Moreover, within a 10 km radius of the Project location, there are accessible bus stops, enhancing transportation options for residents or users of the area. It is important to note that the Project Area, however, lacks close proximity to any dedicated recreational pathways, parks, or additional amenities. Overall, the area lacks the supporting infrastructure and access for recreational users.

4.9 Visual Resources

The area surrounding the bridge site is typically agricultural with limited expectations of significant visual value Sightlines both upstream and downstream are not limited and provide a view of the agricultural and wetland area around the bridge. As no trail is adjacent to the bridge, it is expected that the Project site is of limited visual value except to motorists.

4.10 Environmental Sensitivities

The environmental sensitivities map illustrates the areas of environmental sensitivities and identified development constraints. Figure 4.4 shows the subject site's location in relation to the surrounding major roads and other landmarks with recent aerial photography as a base.

The map illustrates the property boundary or Project Area included in the scope of the assessment; is drawn to scale, with standard mapping elements such as a scale bar, north arrow, date and legend; identifies all of the aquatic, terrestrial, and geomorphological features, natural ecosystems and vegetation communities on the site as referenced in the descriptive report and identified in Section 4 of this report; and identifies all of the terrestrial and aquatic natural features, natural ecosystems and vegetation communities in the surrounding area that might be affected by the proposed site alteration.

740000

N

HORSEHILLS CREEK - WBID 795 -

Wetland

LSD 8 QS SE Sec 18 Twp 54 Rge 23 W4M

LSD 5 QS SW Sec 17 Twp 54 Rge 23 W4M

Wetland

Horsehill Creek Channel

Wetland

Horsehills Creek

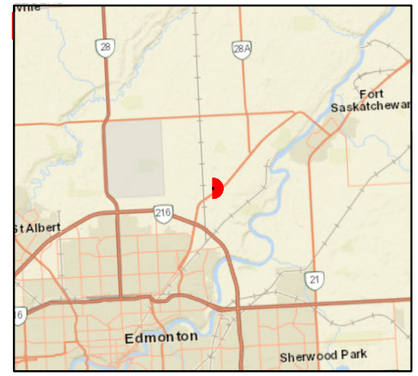
UNNAMED - WBID 42922 -

LSD 1 QS SE Sec 18 Twp 54 Rge 23 W4M

LSD 4 QS SW Sec 17 Twp 54 Rge 23 W4M

18 Street

740000



LEGEND

- Barn Swallow Nest
- Snow Mat (Winter Track Survey)
- Horsehill Creek Channel
- Wetland

TITLE

ENVIRONMENTAL SENSITIVITIES MAP

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Copyright Government of Alberta
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

0 0.005 0.01 0.02
1:945 KM

FIGURE	4.4
DATE	2024-05-25
PROJECT NO.	16547
AUTHOR	RG

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Enviro\16447_Figure_4.5_EnviroSensMap.mxd

5.0
Potential Impacts and Mitigation Measures

5.1 Interactions of the Project with VECs

Potential positive and negative effects on VECs of the Project were evaluated to determine mitigation and best management practices that will reduce the environmental impacts of the Project and any residual negative effects after mitigation has been applied.

The value of a VEC not only relates to its role in the ecosystem, but also to the value placed by humans. Potential VECs were assessed to determine if they are potentially negatively or positively impacted by the Project and if they are subject to stakeholder or regulatory concern.

Table 5.1: VECs and Potential Positive and Negative Effects

VEC	Anticipated Positive Effect	Potential Negative Effect
Geotechnical and Soils	• Removal of potential contaminated soils from the Project Area.	• Alteration of banks as a result of earthworks to achieve engineering requirements • Admixing of soils • Interaction with contaminated soils
Hydrology and Surface Drainage	• Longer bridge will reduce water elevation under the bridge and improve clearance.	• Alteration of surface hydrology of Horsehills Creek • Alteration of drainage patterns • Erosion and sedimentation into Horsehills Creek during construction
Fish and Fish Habitat	• Longer bridge will provide a larger cross-sectional area for fish passage.	• Direct mortality of fish • Alteration of riparian habitat • Sedimentation of the watercourse during construction • Alteration of instream fish habitat
Wildlife and Wildlife Habitat	• Longer bridge will provide additional access for smaller wildlife species.	• Disturbance to breeding or overwintering groups or individuals • Disturbance during the general nesting period • Disturbance of nesting or denning wildlife
Wetlands	• n/a	• Loss of wetland area • Sedimentation of the wetland during construction • Compaction of soils and wetland vegetation species
Vegetation	• Weed control of existing weeds in the Project Area will occur.	• Loss of native plant species and communities • Loss of rare plants and potential rare plant habitat • Introduction of new weed or invasive species • Further establishment of existing weed or invasive species
Historic Resources	• n/a	• Impacts to historical resources
Recreational Resources	• Structural integrity of the bridge is deteriorating. Bridge replacement will maintain usage of the crossing.	• Closures and detours
Visual Resources	• n/a	• Loss of aesthetic value by visitors/recreational users

5.2 Recommended Mitigation Measures

Application of appropriate mitigation measures will reduce the potential effects of the Project on the potential negative effects that are provided in the table above. Table 5.2 provides a list of the effects, the mitigation that should be incorporated as part of the Project, and an analysis of the potential residual effect that may remain after mitigation is implemented.

Table 5.2: Standard and Site-Specific Mitigation for Potential Effects of the Proposed Project

Environmental Component	Potential Effect	Location	Standard Mitigation	Site Specific Mitigation	Potential Residual Effect
Geotechnical	Alteration of banks as a result of earthworks to achieve engineering requirements	Project Footprint	• Work will be suspended during weather that could increase the potential for erosion and sedimentation. • Monitor revegetation of side-slopes and banks to ensure that adequate vegetation is in place to deter sedimentation of any waterbody • Postpone grading until spring breakup if the spoil piles have frozen to an extent that would impair natural water drainage on site. • Restore topography to return drainage patterns as close to original as possible. • Conduct vegetation restoration with fast growing native species immediately after earthworks on banks are complete, to help limit erosion and dust. Consider planting plugs instead of seeding. • Monitor areas of potential terrain instability following construction. Conduct remedial erosion control work, as needed	• Limit impacts to landscape by limiting footprint of project to extent feasible. • Follow recommendations in the Hydrotechnical report for armoring and bank geotechnical requirements	No residual effect identified
	Admixing of Soils	Project Footprint		• Limit impacts to landscape by limiting footprint of project to extent feasible.	No residual effect identified
	Chance finds of contaminated soils	Project Footprint		• Limit impacts to landscape by limiting footprint of project to extent feasible. • Soil removed from the top 1 m should be considered contaminated and be disposed of at a Class 2 landfill. • The Contractor will develop a Contaminated Soil Chance Find Procedure and will notify the consultant if during construction within the project area visual and/or olfactory signs of soil hydrocarbons or other contaminates.	No residual effect identified
Hydrology and Surface Drainage	Alteration of surface hydrology of Horsehills Creek	Project Footprint, Local	• Work will be suspended during weather that could increase the potential for erosion and sedimentation. • Install effective erosion and sediment control measures before starting work to prevent sediment from entering the waterbody. • During soil disturbance activities identify locations where gaps in snow, topsoil, and spoil, if needed, are to be created. Gaps are typically associated with terrain features (*e.g.*, slope changes), and crossings (*e.g.* roads).	• Design has been complete to extend bridge, therefore not impacting surface hydrology	No residual effect identified
	Alteration of drainage patterns	Project Footprint		• Maintain drainage patterns through the site through design.	No residual effect identified
	Erosion into Horsehills Creek	Project Footprint, Local		• Develop a site-specific ESC plan for the Project area to be incorporated by the Contractor and ensure the ESC measures are inspected by a qualified professional (e.g., CPESC) on a frequent basis • Monitor revegetation of side-slopes to ensure that adequate vegetation is in place to deter sedimentation entering the Creek. • Ensure that design of the bridge and approach structures transport precipitation away from the creek, towards well vegetated areas to allow for sediment to settle out before entering any waterbody • Do not remove root systems of vegetation wherever feasible, to limit erosion and dust.	No residual effect identified
Fish and Fish Habitat	Direct Mortality of Fish	Project Footprint	• Restrict construction activities to designated workspace, access routes and approved temporary workspace. • Maintain equipment in good working conditions and ensure that equipment and vehicles are free of leaks. • Do not wash equipment or machinery in Horsehills Creek. Control wastewater from construction activities to ensure it does not enter Horsehills Creek. • Prohibit fuel storage, refueling, or servicing of equipment within 100 m of any waterbodies (i.e., Horsehills Creek), except where secondary containment and/or tertiary containment is provided. • Ensure no fuel, lubricating fluids, hydraulic fluids, methanol, antifreeze, herbicides, biocides, or other chemicals are release on the ground or into any waterbody (i.e., Horsehills Creek). • Where practical, delay grading until immediately before construction of the crossing. If required, appropriate temporary erosion and sediment control structures should be installed. • Direct the grading away from Horsehills Creek to the extent possible, to reduce the risk of sedimentation. • Store spoil in a manner that does not interfere with natural drainage patterns. • Install erosion and sediment control measures where warranted, prior to commencing grading and existing bridge removal, in the vicinity of watercourse crossings. • Reduce clearing of extra temporary workspace to the extent practical. Ensure staging areas for crossing construction and grade/borrow areas for spoil storage are located outside the riparian area. • Vegetative buffers should be maintained where feasible.	• Consider implementing fish scare tactics (e.g., scare pass with electrofisher) prior to installation of isolation to reduce the number of fish within isolated area. • Conduct a fish rescue in all isolated areas prior to any in-water works taking place. • Block fish from entering in-water work areas before the fish rescue and in-water works occur.	No residual effect identified
	Alteration of instream fish habitat	Project Footprint		• Limit impacts to the riparian area by limiting vegetation removal to the extent required. • Avoid work within the normally wetted area of the waterbody. • Minimize in-water work requirements to the extent required.	**Alteration of instream fish habitat**
	Alteration of riparian habitat	Project Footprint		• Limit impacts to the riparian area by limiting vegetation removal to the minimum extent required.	No residual effect identified
	Sedimentation of the watercourse during construction	Project Footprint, Local		• Implement adequate erosion control on upslope areas to prevent release of suspended sediment. • Inspect temporary sediment control structure on a regular basis,and following precipitation events and snowmelt. Undertake repairs where required. • Use dams made of non-earthen material such as water-inflated portable dams, concrete blocks, sandbags, sheet piling, clean rock, or other appropriate designs to separate the work site from flowing water • If pumping occurs, pump sediment laden dewatering discharge into an approved upland vegetated area or settling basin to prevent sediment and other deleterious substances from directly re-entering Creek. • Follow guidance on screen design found in DFO's Freshwater Intake End-of- Pipe Fish Screen Guideline (DFO 1995). • Clean isolated area before removing any isolation • Monitor to assess sediment release (i.e., turbidity and Total Suspended Solids [TSS]) during construction.	**Increase of suspended sediment during in-water construction**

Environmental Component	Potential Effect	Location	Standard Mitigation	Site Specific Mitigation	Potential Residual Effect
Wildlife and Wildlife Habitat	Disturbance to breeding or overwintering groups or individuals	Project Footprint	• Work only within designated areas within the Project work area • If an active nest or den is suspected within or near the work area during construction, establish a work buffer and contact a qualified wildlife biologist immediately. • Avoid disturbance of natural habitats by minimizing work footprint to established rights-of-way, trails, pads, etc.	• Implement construction outside the general nesting period for raptors and migratory birds for this region (i.e., March 15 to August 31) • If clearing is required within known breeding periods, an inclusive preconstruction wildlife survey should be completed by a qualified specialist. If breeding activity is observed, appropriate disturbance buffers should be implemented.	No residual effect identified
	Disturbance during the general nesting period	Project Footprint, Local		• If clearing is required within known breeding periods, migratory bird breeding surveys should be completed by a qualified avian specialist. If breeding bird activity is observed, appropriate disturbance buffers should be implemented until young have fledged and left the nesting area.	No residual effect identified
	Disturbance of nesting or denning wildlife.	Project Footprint, Local		• Implement construction outside the general nesting period for raptors and migratory birds for this region (i.e., March 15 to August 31) • If clearing is required within known breeding periods, an inclusive preconstruction wildlife survey should be completed by a qualified specialist. If breeding activity is observed, appropriate disturbance buffers should be implemented.	No residual effect identified
Wetlands	Wetland Area loss	Project Footprint, Local	• Stake boundaries of the construction footprint, temporary workspace, stockpiles and any access. Do not allow disturbance beyond the stakes unless additional workspace rights have been obtained. Restake/flag the boundaries where warranted. • Do not install permanent sub surface cut-off or actively dewater off site waterbodies. • Install effective erosion and sediment control measures before starting work to prevent sediment from entering any off-site waterbody (e.g., ditches, Horsehills Creek, wetlands). • Follow wildlife mitigation measures, for wildlife of wetland habitats (e.g. amphibians) • Maintain equipment in good working condition and ensure that equipment and vehicles are free of leaks. • Do not wash equipment or machinery near any waterbody. Control wastewater from construction activities by diverting wastewater to confirmed upland locations. • Prohibit fuel storage, re-fueling, or servicing of equipment within 100 m of any waterbody. • Ensure no fuel, lubricating fluids, hydraulic fluids, methanol, antifreeze, herbicides, biocides, or other chemicals are released on the ground or into any waterbody. • The Contractor shall develop and implement an Environmental Construction Operation (ECO) Plan and Spill Response Plan. Implement an Erosion and Sediment Control (ECS) Plan where warranted to limit potential for off-site siltation of nearby waterbodies.	• Ensure construction avoids work within wetland areas excluded from the regulatory approvals. Have records of regulatory approvals available on site in the site trailer or foreman's truck.	**Loss of Wetland Area**
Vegetation	Loss of native plant species and communities	Project Footprint	• Narrow construction limits to the minimum required for construction. • Do not plan for placement of temporary workspace where significant tree or shrub removal is required to accommodate it and instead preferentially locate workspace on agricultural lands. • Prior to construction, manage weeds located on the construction footprint during previous growing season. This is to additionally include locations of temporary workspace, staging and stockpile areas. • Do not park or store vehicles, equipment, materials or machinery on invasive plant infestations. If a weed infested area must be used for material or equipment storage, treat or remove invasive plants prior to use of the area. • Construction equipment must be clean and free of soil or vegetative debris before its arrival on the Project site to reduce the risk of weed introduction. Any equipment that arrives dirty, will not be permitted on the construction footprint. • The contractor is to review site-specific locations to be avoided during topsoil movement and any grading activities. • Install signage on the fences of avoidance areas to alert workers of the presence of sites to be avoided or where special measures are necessary (e.g. weed infestations, Horsehillls Creek) • Clear vegetation only to the extent warranted to reduce the loss of native vegetation and reduce the potential for terrain instability and erosion.	• Fence boundaries to avoid disturbance of any additional natural habitat beyond the Project workspace, around Horsehills Creek and its wetland fringe area. Do not allow clearing or grading beyond the fencing unless mitigation plans and approvals for that area have been made/obtained. Re-fence the boundaries where warranted following disturbance.	**Loss of existing native plants**

	Introduction of new weed or invasive species	Project Footprint		• Weeds: The Project area has moderate densities of weed species. Weed control prior, during, and following construction, as well as equipment cleaning and soil handling procedures to minimize weed spread, is recommended, including:
				  • Clean all construction equipment prior to its arrival on site and following exit of the site to prevent the introduction of new weed species to the site or of weed species on site to other locations.
				  • Conduct weed control (if prior to seed set) before construction commences.
				  • Monitor weed growth during construction occurring in the growing season and conduct weed control on soil storage piles and elsewhere, if necessary. Do not utilize the soil in weed infested areas on other projects to avoid transferring weeds to other locations.
				  • Conduct post-construction monitoring of weed growth and conduct weed control if necessary. Implement a multi-year weed control and monitoring program.
					Introduction or further establishment of weed or invasive species.

	Further establishment of existing weed or invasive species	Project Footprint			

Environmental Component	Potential Effect	Location	Standard Mitigation	Site Specific Mitigation	Potential Residual Effect
			• Monitor weed growth monthly in the growing season during the course of construction and conduct corrective measures. • Use equipment that will avoid or reduce disturbance and deposition of debris off the construction footprint. • If warranted, lay geotextile material such as matting over sensitive erosional areas to reduce soil and surface vegetation effects. • Conduct native vegetation restoration at earliest possible date. On erosional slopes use a fast growing, certified weed free native seed mix not more than 2 years old. Certification must be provided and approval by the Engineer is required prior to planting/seeding. Plant replacement native trees and shrubs where removed for construction. • After seeding or planting, reduce foot traffic until establishment has occurred. • Vehicle traffic should be prohibited on newly vegetated areas until establishment. • Implement a post-construction monitoring program to monitor weeds at least twice during the growing season post construction for 2 years. • If weed species on the *Weed Act* are observed, they are to be immediately controlled or eradicated as per the *Weed Act*.	• Utilize a certified and licensed pesticide applicator company to conduct any chemical control of weeds. • If Noxious weeds (as listed by the Government of Alberta) are mechanically controlled (cutting, mowing, pulling), remains should be collected, double bagged and disposed of in deep burial at a landfill. • Seeding with a certified weed free mix of native grasses, or plugs, following construction activities (or in the spring of the following growing season) is recommended.	
Historic, Archaeological and Paleontological Resources	Impacts to historical resources	Project footprint	• The Contractor shall develop a Chance Find Procedure for Historical Resources. Any discovery of additional archaeological resources, palaeontological resources, Aboriginal traditional use sites and/or historic sites are required to be reported to the Engineer and to the Ministry of Arts, Culture and Status of Women.	• n/a	**Incidental impacts on previously unknown historical resources.**
Recreation Resources	Trail closures and detours	Local Study Area	• Preferentially choose bridge construction options that result in shorter construction times to minimize disruption to users. • Provide and install ample signage describing closures and alternate routes well ahead of construction. • Preferentially conduct bridge construction at known low use times of the year.	• Provide signage notifying the public of closures and providing detour options.	**Loss of user access during construction**
Visual Resources	Loss of aesthetic value by visitors/recreational users	Project footprint and temporary workspace	• Narrow construction limits to the minimum required for construction. • Conduct native vegetation restoration at earliest possible date.	• Seed with approved City seed mixes, specifically: Dry Meadow Seed Mix for slopes and Wet Meadow Seed Mix for riparian areas.	No residual effect identified

5.2.1 Methodology

Residual effects are those environmental effects that may exist following the implementation of mitigation measures. This section provides an assessment and characterization of the potential residual effects in order to determine their likelihood and significance. Table 5.3 provides a summary of the significance evaluation for the potential residual effects of the Project on the VECs and the following sections describe the rationale behind the evaluation.

Table 5.3: Evaluation of the Residual Negative Effects of the Project

VEC	Potential Effect	Nature	Magnitude	Duration	Extent	Likelihood of Effect	Significance
Geology, Slope Stability and Soils	No residual effect identified	n/a					
Hydrology and Surface Drainage	No residual effect identified	n/a					
Fish and Fish Habitat	Alteration of instream fish habitat	Direct	Low	Permanent	Restricted	Predictable	Non-significant
	Increase of suspended sediment during in-water construction	Indirect	Low	Short-Term	Local	Uncertain	Non-significant
Wildlife and Wildlife Habitat	No residual effect identified						
Wetlands	Loss of wetland area	Direct	Low	Permanent	Restricted	Predictable	Non-significant
Vegetation	Loss of existing native plants	Direct	Low	Medium-Term	Restricted	Predictable	Non-significant
	Introduction or further establishment of weed or invasive species.	Indirect	Moderate	Medium-Term	Restricted	Uncertain	Non-significant
Historic Resources	Incidental impacts on previously unknown historical resources.	Direct	Moderate	Permanent	Restricted	Predictable	Non-significant
Recreation Resources	Loss of user access during construction	Indirect	Low	Short-Term	Restricted	Predictable	Non-significant
Visual Resources	No residual effect identified	n/a					

Residual Effect Evaluation

Each negative residual effect, and how its significance rating was evaluated is analyzed in detail in the below sections:

Alteration of Fish Habitat

A summary of the rationale for the significance criteria evaluation is provided below:

- Nature: Direct – Loss of habitat would only occur in areas directly impacted by installation of riprap.
- Magnitude: Low – Total area of riprap is quite small compared to overall creek area available for fish habitat.
- Duration: Long Term – Installation of riprap would be a permanent measure.
- Extent: Restricted – Alteration would only occur where riprap is present.
- Likelihood: Certain – Riprap instream is requirement for the Project to protect the new bridge.

Significance Evaluation
Residual sediment effects are considered to result in low magnitude impacts to fish and fish habitat; therefore, the residual effect is considered not significant.

Increase of Suspended Sediment During In-Water Construction

A summary of the rationale for the significance criteria evaluation is provided below:

- Nature: Indirect – Sedimentation of Horsehill Creek would occur as an indirect cause of construction, such as a sediment release during bridge abutment demolition or riprap installation.
- Magnitude: Low – Sedimentation is likely to occur in small amounts during the installation and removal of isolation measures.
- Duration: Short Term – Sedimentation would only occur during the demolition or construction during in-water.
- Extent: Local - Sedimentation would only occur at the construction site, and to the Zone of Influence of the Project, approximately 100 m downstream of the site.
- Likelihood: Uncertain – The likelihood of sedimentation is unknown and will be dependent on the Contractor's approach to construction (e.g., type of isolation).

Significance Evaluation
Residual sediment effects are considered to result in low magnitude impacts to fish and fish habitat, over a short-term duration and restricted to a local area and can typically be well managed during construction; therefore, the residual effect is considered not significant.

Loss of Wetland Area

A summary of the rationale for the significance criteria evaluation is provided below:

- Nature: Direct – Loss of wetland area is a negative effect.
- Magnitude: Low – Loss is expected to be minimal after mitigation (compensation fees) applied.
- Duration: Long Term – Wetland habitat loss in the area will be permanent.
- Extent: Restricted – Within areas where wetlands are infilled, loss will be in that area.
- Likelihood: Predictable – Impacts of construction activities on wetlands is well known.

Significance Evaluation
The Project is located in an area with existing roadway and agricultural activity; the loss of small wetland portions is unlikely to exert any measurable effect on the broader environment in the regional extent. As such, the magnitude of these changes in the area are considered low. As permanent loss of wetlands also requires compensation through the *Water Act* approval and compensation fees (fees are to be used to enhance or create new wetlands in the region), the residual effect is considered to be non-significant.

Loss of Existing Native Plants and Communities.

A summary of the rationale for the significance criteria evaluation is provided below:

- Nature: Direct – vegetation located in areas of temporary use or where new hardscaping will be placed, will be disturbed (cut/removed/crushed) to facilitate construction.
- Magnitude: Low – Vegetation removal will be limited to commonly observed local species (i.e., no rare species were observed during field studies), is limited in the amounts removed around the bridge and where access is deemed necessary
- Duration: Medium Term – Vegetation removed for access is expected to naturally revegetate in one to three years.
- Extent: Restricted – Vegetation removed will be limited to the footprint of the Project.
- Likelihood: Predictable – Vegetation removal is well understood. Placement of rip-rap will result in less naturally vegetated area than prior to construction.

Significance Evaluation
As the magnitude of effects to vegetation is considered low, the duration medium-term and extent restricted the residual effect is considered not significant. Any effects to native vegetation communities are relatively small and will equitably mitigated for by re-seeding or planting of disturbed areas where feasible will be conducted following bridge replacement activities, to mitigate for some of the loss of vegetation communities.

Introduction or Further Establishment of Weed or Invasive Species

A summary of the rationale for the significance criteria evaluation is provided below:

- Nature: Indirect – Introduction of weeds would be an indirect effect of the Project, as it would occur as an indirect effect of construction.
- Magnitude: Moderate – Introduction of weeds could result in an increase of invasive species and cause an alteration of the native plant community.
- Duration: Medium-Term – Weeds that are introduced by the Project would require control by the Contractor during construction and through the warranty period.
- Extent: Restricted – Introduction of weeds would be limited to workspace that the Contractor utilizes (i.e., the footprint of the Project where bare soils may be present at some point).
- Likelihood: Uncertain – The likelihood of weed introduction is unknown and will be dependent on the Contractor's approach to construction (e.g., diligence on following cleaning mitigation).

Significance Evaluation
Residual weed and invasive species effects are considered to result in moderate magnitude impacts to vegetation, over a moderate term duration and restricted to a local area and can typically be well managed during construction by a diligent Contractor; therefore, the residual effect is considered not significant.

Incidental Impacts on Previously Unknown Historical Resources

A summary of the rationale for the significance criteria evaluation is provided below:

- Nature: Direct – Impacts to previously unknown historical resources could be caused directly by Construction.
- Magnitude: Moderate – Impacting historic features could be seen as moderate magnitude due to their importance, however important historical features are unlikely to occur as per the HRO.
- Duration: Permanent – Impacts to historical resources during construction would be permanent.
- Extent: Restricted – Impacts are restricted to the footprint of the Project.
- Likelihood: Predictable – The likelihood of finding unknown historical resources is considered predictable and unlikely, as historical work has been completed for the Project to proactively determine that the Project is low risk for historical features.

Significance Evaluation
Impacts to previously unknown historical resources is an unlikely event and can typically be well managed during construction by a diligent Contractor. Therefore, the residual effect is considered not significant.

Loss of Recreational Access During Construction

A summary of the rationale for the significance criteria evaluation is provided below:

- Nature: Indirect – Impacts to recreational users will be indirect, as it will force the low number of users through detours.
- Magnitude: Low – The detours will be well marked, and construction staging can limit the total length and number of detours.
- Duration: Short Term – Detours and access limitations will only occur during construction.
- Extent: Local – Detours will occur at and around the Project site.
- Likelihood: Predictable – The detours are required for construction to occur safely.

Significance Evaluation
Impacts to recreational access is of a limited timespan that will only occur during construction. Additionally, there are limited recreational users of this bridge. Ultimately, the Project will expand the lifespan of access to crossing Horsehills Creek, so therefore is considered not significant.

5.2.2 Discussion of Cumulative Impacts

Cumulative effects are defined as changes caused by actions of the past, present and future (CEAA 2016). Since thresholds for impacts to VECs are not defined by the City, assessing cumulative impacts is limited to a qualitative assessment of potential cumulative effects on environmental resources (Hegmann et. al 1999). The Operational Policy Statement, *Technical Guidance for Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012*, was utilized as a guidance for determining likelihood and significance of adverse effects (CEAA 2018). As this Project is a like-for-like replacement, it is considered unlikely to contribute to any cumulative effects to the area or the City in general. Furthermore, as no residual effects are considered significant, it is recommended that cumulative impacts be deemed non-significant.

6.0 Summary Assessment

6.1 Regulatory Summary

See Appendix C, Enviso Checklist, for a complete examination of the applicable regulatory permits and approvals. It is anticipated that the Project will require clearance, permit or approval under the following regulations:

- Federal *Fisheries Act*,
- Alberta *Water Act*,
- Alberta *Historical Resources Act*,
- Alberta *Public Lands Act*
- City of Edmonton's *Tree Management Policy*
- City of Edmonton's *River Valley Bylaw 7188*

6.2 Impacts Summary

See Table 5.2 for a complete list of anticipated positive and negative impacts, as well as Table 5.3 for a discussion of potential negative residual impacts of the Project on VECs. No impacts for the Project are considered significant, and the Project can proceed with low risk to the environment.

6.2.1 Cumulative Effects

This Project limits cumulative impacts on the environment by replacing the bridge while maintaining the existing road network, providing an increased lifespan to 18 Street while limiting new direct impacts. As no residual effects are considered significant, it is recommended that cumulative impacts be deemed non-significant.

6.3 Monitoring and Follow-up Requirements

The Contractor's ECO Plan will outline details on how the Project's construction activities will incorporate mitigation measures as outlined in the EIA, meet all environmental regulatory requirements, and minimize environmental impacts. Environmental Monitoring will be a key component to ensure that the objectives of the ECO Plan are being met and to establish due diligence. The Contractor will be responsible for Environmental Monitoring and Mitigation under the ECO Plan.

The Contractor shall develop an ECO Plan as per the City of Edmonton's *ECO Plan Framework* (2020b). The Contractor's ECO Plan will outline details on how the Project's construction activities will incorporate mitigation measures as outlined in the EIA, meet all environmental regulatory requirements, and minimize environmental impacts. Environmental Monitoring will be a key component to ensure that the objectives of the ECO Plan are being met, and to establish due diligence. The Contractor will be responsible for Environmental Monitoring and Mitigation under the ECO Plan.

It is recommended that the ECO Plan incorporate Environmental Monitoring including but not limited to the following:

- ESC measures;
- Turbidity monitoring during in-water work, particularly during instream works;
- Isolation monitoring;
- Fish salvage and rescue;
- Weed monitoring during and post construction including a multi-year weed control and monitoring program;
- Vegetation disturbance monitoring to ensure construction disturbance does not extend beyond limits necessary;
- Vegetation monitoring post construction until vegetation is established;
- Wildlife monitoring and nest sweeps pre disturbance as outlined in the Wildlife section; and
- Additional monitoring as per regulatory approvals and conditions.

6.4 Summary Assessment and Conclusions

The Project occurs in an area of environmental sensitivity, which triggers this EIA. Based on the Project details, the utilization of standard mitigation and the relatively low risk nature of replacing a bridge with a bridge, no impacts for the Project are considered significant, The Project can proceed with an overall low risk to the environment.

7.0
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Appendix A

Environmental Impact Assessment Terms of Reference

7909 51 Avenue NW, Edmonton AB T6E 5L9, T: 780.438.9000 F: 780.438.3700

January 22, 2024

Our Reference: 15616

The City of Edmonton
URBAN GROWTH & OPEN SPACE

Attention: Achyut Adhikari

Dear Mr. Adhikari:

Reference: 18 Street Horsehill Creek Bridge – Environmental Impact Assessment Terms of Reference

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As per the North Saskatchewan River Valley Area Redevelopment Plan (Bylaw 7188), and the meeting held between ISL Engineering and Land Services Ltd. (ISL) and The City of Edmonton (The City) on January 12, 2024, a draft Terms of Reference (TOR) is required to be prepared and reviewed prior to initiation of an Environmental Impact Assessment (EIA).

This letter provides the draft TOR for review and acceptance from The City. Upon agreement of the following Terms of Reference, the EIA will be prepared by ISL and submitted to The City of Edmonton, upon which it will be reviewed by City Administration as required by Bylaw 7188. It is also understood that the EIA, will require approval by City Council. As per the meeting on January 12, no Site Location Study (SLS) will be prepared, as no change in bridge location is expected. If this changes through future design requirements, ISL will confirm if an SLS is required.

1. **Introduction -** Includes background, objectives, study area, and report organization.
2. **Project Description**
   - **2.1. Declaration**
   - **2.2. Project Need/Rationale –** Will include reference to the City's RFP# 935386 and preliminary design report. Using these resources, the EIA will provide justification in support of the project.
   - **2.3. Project Alternatives Considered**
   - **2.4. Project Details -** A detailed description of the project including: project location/setting; project construction details; land use and zoning; scope of work; and key project activities
   - **2.5. Environmental permitting requirements**.
3. **Methodology -** Descriptions of the main methods and steps employed in the preparation of the EIA, including: literature review, assessment scoping, valued environmental components (VECs) description of existing conditions, impact analysis, and public consultation.
4. **Existing Conditions** - Includes descriptions for each of the following VECs:

   - **4.1.** Geology/Slope Stability/ Soils: Utilizing information from Thurber's Geotechnical report and Thurber's Environmental Sampling Report.
   - **4.2.** Hydrology/Surface Drainage
   - **4.3.** Fish and Fish Habitat
   - **4.4.** Wildlife and Wildlife Habitat
   - **4.5.** Wetlands
   - **4.6.** Vegetation
   - **4.7.** Historical Resources
   - **4.8.** Recreational Resources

4.9. Visual Resources.

5. **Potential Impacts and Mitigation Measures -** Interactions of specific project activities (demolition, construction, operations) with VECs and socioeconomic factors and recommended mitigation measures.
6. **Summary Assessment -** Includes: a summary of impacts; monitoring and follow-up requirements; environmental protection planning; and summary assessment and conclusions.
7. **References**
8. **Appendices**

We trust this TOR meets your expectations, and if you have any additions or changes or accept this TOR as proposed, please advise the undersigned.

Brent Piche, B.Sc., P.Biol. R.P.Bio
Lead, Environmental Services
ISL Engineering and Land Services Ltd.
403.254.0544
bpiche@islengineering.com

Appendix B

Historical Photography

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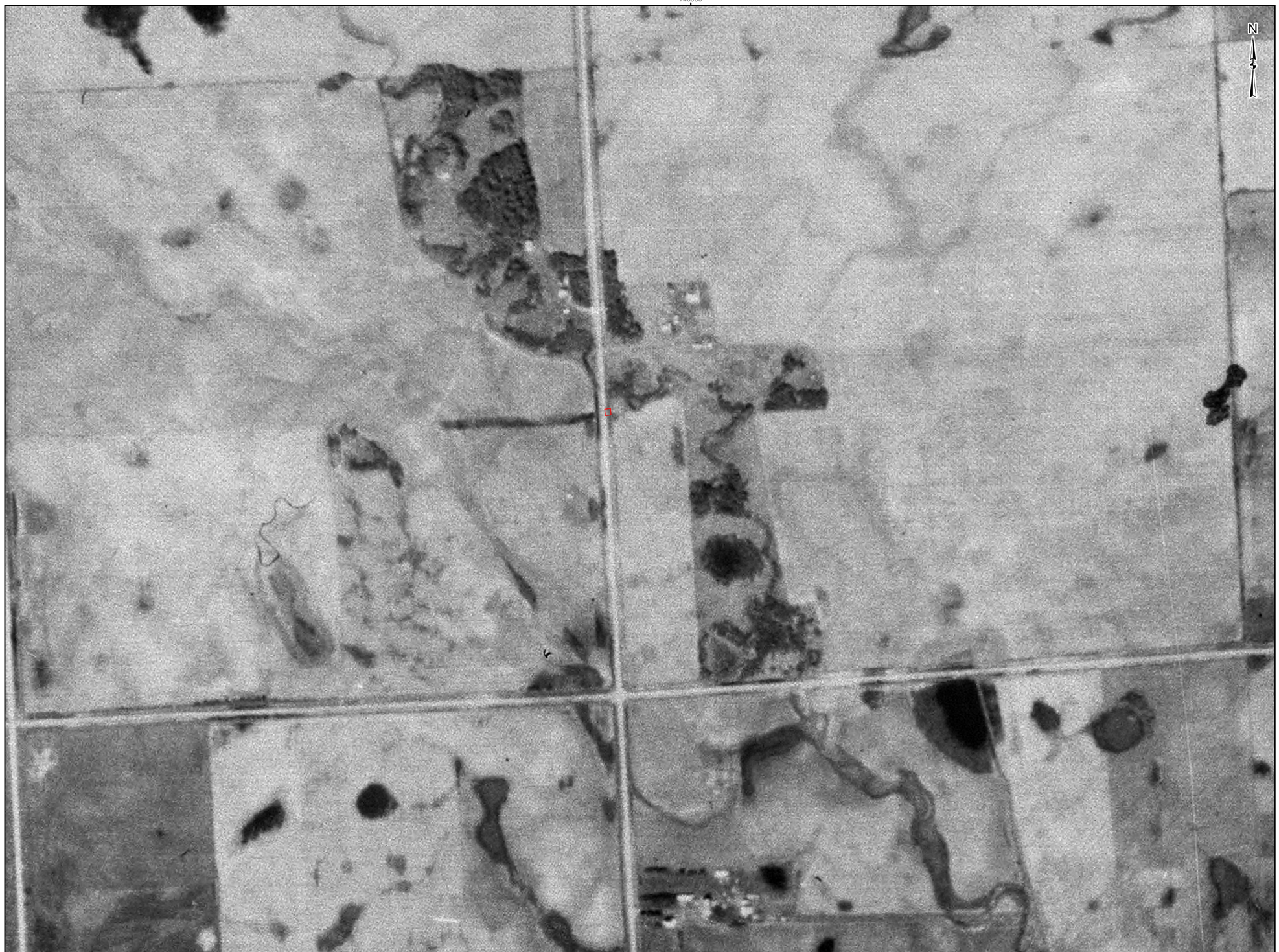

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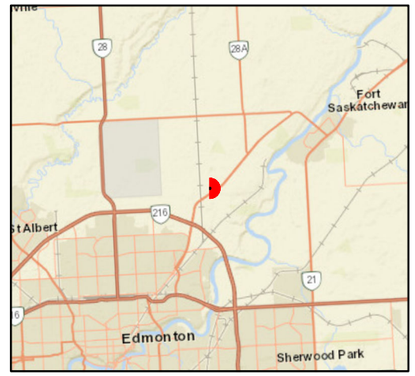

LEGEND

Bridge Replacement Location

TITLE

HISTORICAL PHOTOGRAPHY
1949

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

PROJECTION

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AUTHOR	RG

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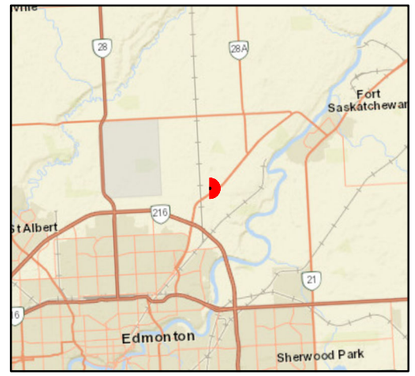

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Bridge Replacement Location

TITLE

HISTORICAL PHOTOGRAPHY
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PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

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AUTHOR	RG

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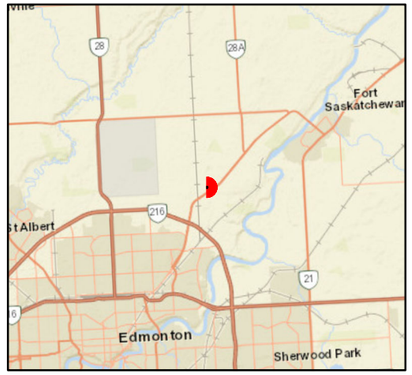

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Bridge Replacement Location

TITLE

HISTORICAL PHOTOGRAPHY
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PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

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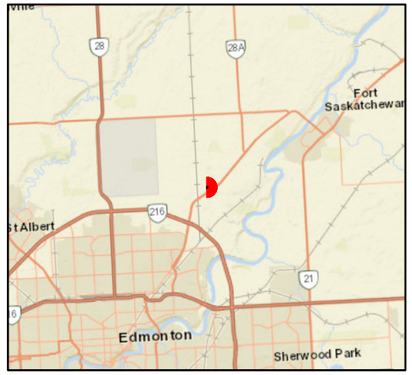

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Bridge Replacement Location

TITLE

HISTORICAL PHOTOGRAPHY
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PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

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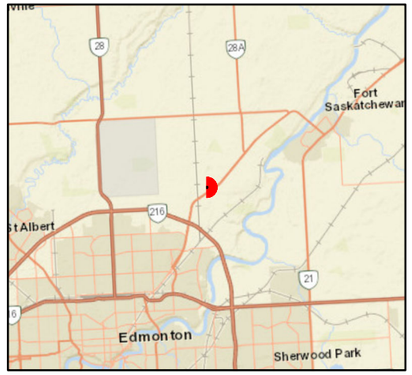

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Bridge Replacement Location

TITLE

HISTORICAL PHOTOGRAPHY
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PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

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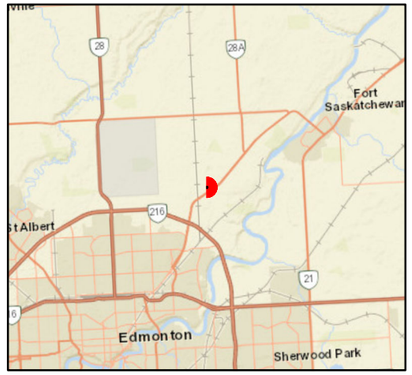

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LEGEND

Bridge Replacement Location

TITLE

HISTORICAL PHOTOGRAPHY
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PROJECT

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CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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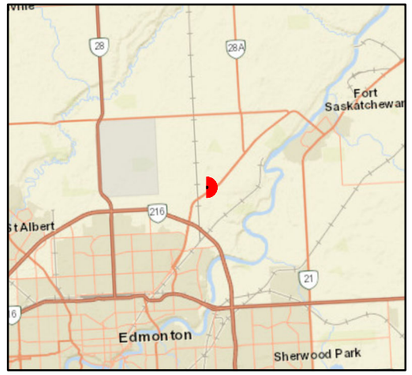

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Bridge Replacement Location

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HISTORICAL PHOTOGRAPHY
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PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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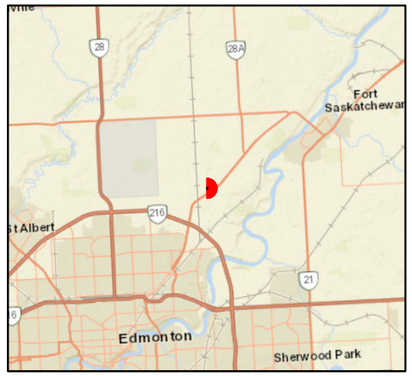

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Bridge Replacement Location

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HISTORICAL PHOTOGRAPHY 2001

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

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PROJECT NO.	16547
AUTHOR	RG

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Enviro\HistPhotos\16447_Figure_HistPhotos.mxd

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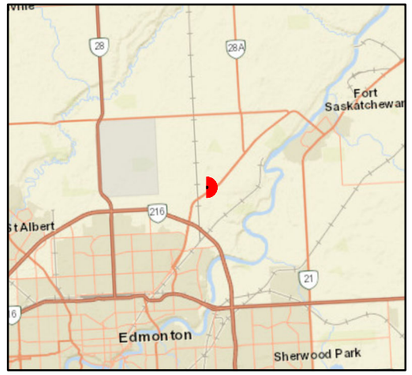

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LEGEND

Bridge Replacement Location

TITLE

HISTORICAL PHOTOGRAPHY
2006

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

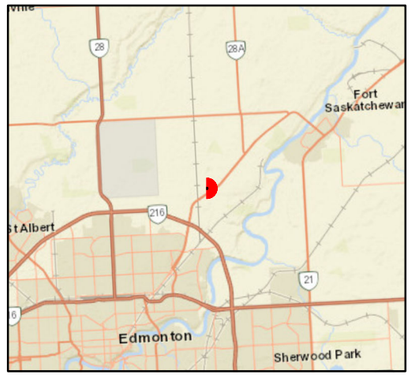
0 0.035 0.07 0.14
1:5,000 KM

FIGURE	J
DATE	2024-02-05
PROJECT NO.	16547
AUTHOR	RG

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Enviro\HistPhotos\16447_Figure_HistPhotos.mxd

740000

740000



LEGEND

Bridge Replacement Location

TITLE

HISTORICAL PHOTOGRAPHY 2007

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

0 0.035 0.07 0.14

1:5,000 KM

FIGURE	I
DATE	2024-02-05
PROJECT NO.	16547
AUTHOR	RG

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Enviro\HistPhotos\16447_Figure_HistPhotos.mxd

Appendix C

ENVISO and
Enviro Permit Checklists

Environmental Permit / Approval Checklist					
Project: 18 Street at Horsehill Creek Bridge Replacement				IIS Project Manager: Jolanta Wandzel-Mrugala	
Project Description: Replacement of bridge at 18 Street over Horsehill Creek					
Federal Agency	**Federal Regulation**	**Requirement**	**Applicable Y/N/U**	**Completed or Received Date**	**Comments and Restrictions / Conditions to be Followed**
Fisheries and Ocean Canada (previously DFO) (Federal)	Fisheries Act	Complete Self Assessment	n/a	n/a	Self-assessment is not longer valid under Fisheries Act 2019. RFR to be completed
		Fisheries "Request for Review" Form required if criteria not met	Y	TBD	To be submitted following Fisheries Assessment
		"Application Form for Authorization" if required	N	TBD	TBD
		Authorization or Letter of Advice obtained	N	TBD	TBD
		Fish Habitat Compensation Plan required	N	TBD	TBD
Transport Canada (Federal)	Canadian Navigation Waters Act	Review schedule to NPA and Minor Works and Waters Order (MWWO)	N	n/a	Unlikely to be navigated based on AT Navigation Map. Therefore not navigated under the CNWA
		Request required from TC in order to determine if navigable if unsure	n/a	n/a	n/a
		"Application for Approval" required	n/a	n/a	n/a
		Approval/Work Assessment obtained	n/a	n/a	n/a
Canadian Environmental	Canadian Environment	Environment Assessment (EA) required	N	n/a	n/a
Environment Canada (Federal)	Migratory Birds Convention Act (MBCA)	Restrictions on Work Activities (varies, May 1-August 10 general rule of thumb)	Y	TBD	Wildlife sweeps must occur. See mitigation in EIA.
		Field Assessment (Nest Sweep) required before or during construction	Y	TBD	Wildlife sweeps must occur. See mitigation in EIA.
	Species at Risk Act (SARA)	Search of ACIMIS, FWMIS and COSEWIC	Y	1-Feb-24	No SARA listed on ACIMS/FWMIS/COSEWIC Present
		Field Assessment required	Y	Spring 2024	Wildlife field assessment results provided in EIA.
		Permit or Agreement required	N	n/a	n/a
		Restrictions on Work Activities	N	n/a	n/a
Provincial Agency	**Provincial Regulation**	**Requirement**	**Applicable Y/N**	**Completed or Received Date**	**Comments and Restrictions / Conditions to be Followed**
Alberta Environment and Protected Areas (Provincial)	Water Act	Code of Practice (CP) review	Y	n/a	COP to be submitted at construction.
		Notification sent if CP applicable	Y	n/a	COP to be submitted at construction.
		Approval/License Required if CP is not applicable i.e. cannot meet requirements in CP	n/a	n/a	n/a
		Wetland Assessment required by a QAES	Y	n/a	Wetland assessment occured in May 2024
		Compensation Plan required	Y	n/a	yes
		Restricted Activity Periods (RAPs) applicable	Y	n/a	Results provided in EIA
	Environmental Protection and Enhancement Act (EPEA)	Consultation with Regulators	Y	n/a	n/a
		Screening Report or Environment Impact Assessment (EIA) required	n/a	n/a	n/a
		Public consultation required	n/a	n/a	n/a
Alberta Culture and Community Spirit (ACCS) (Provincial)	Historical Resources Act (HRA)	HRA approval	Y	Y	Submitted Feb 13, 2024
		Consultation with First Nations required	N	n/a	TBD
		Consultation with accredited archaeologist	Y	TBD	Submitted Feb 13, 2024
		Statement of Justification (SOJ) notification required	Y	TBD	Submitted Feb 13, 2024
		Historical Resource Impact Assessment (HRIA) required	N	n/a	To be confirmed by regulator, but not recommended by SoJs
		Clearance Letter received from ACCS	N	TBD	TBD
Sustainable Resource Development (Provincial)	Public Lands Act	Department Licence of Occupation (DLO) or Temporary Deposition required	TBD	TBD	**Currently not required as works occurs within road allowance. If bridge**
	Wildlife Act	Wildlife Assessment required	Y	Spring 2024	Wildlife assessment occuring for EIA
		Restriction on activities	see comments	n/a	Construction timing and sweeps

Environmental Permit / Approval Checklist					
Project: 18 Street at Horsehill Creek Bridge Replacement				**IIS Project Manager: Jolanta Wandzel-Mrugala**	
Project Description: Replacement of bridge at 18 Street over Horsehill Creek					
Federal Agency	**Federal Regulation**	**Requirement**	**Applicable Y/N/U**	**Completed or Received Date**	**Comments and Restrictions / Conditions to be Followed**
Municipal	**Municipal Regulation**	**Requirement**	**Applicable Y/N**	**Completed or Received Date**	**List All Restrictions or Conditions to be Followed**
Municipal (City of Edmonton)	COE Tree Management Policy	Notification to COE if trees affected	N	n/a	no trees impacted
	Community Standards Bylaw	Noise Exemption Permit required	N	n/a	All work occurring within daytime hours
	River Valley Bylaw 7188	North Saskatchewan River valley ARP Project review form completed and submitted	Y	1-Feb-24	Scoped directly with UGS. No form required.
		Environmental Report required	Y	1-Jul-24	EIA is complete. No SLS is required as per Scoping.
	Contaminated Sites	COE - Engineering Services consultation to check their database and ESAR (Alberta Environment's Environmental Site Repository)	Y	TBD	Phase 2 ESA completed with recommendations for construction. COE Engineering should still complete screening review
		Further assessment recommended	N	TBD	Phase 2 ESA completed with recommendations for construction
	Drainage Bylaw	Permit required to discharge site effluent into Storm / Combined / Sewer	N	n/a	n/a
	Erosion & Sedimentation Control	Permanent ESC Design required	N	n/a	n/a - like for like replacement
	Wildlife Passage Engineering Design Guidelines (WPEDG)	Wildlife Passage Design required **&** Complete Appendix D Checklist of WPEDG	Y	n/a	Wildlife assessment occurring, no change to passage
	Natural Area Systems Policy	Natural Area may be impacted by project	Y	Jul-24	See EIA
Completion Verification					
Completed By:		Brent Piche		**Date:**	July/8/2024
Comments:					
					Version 1.15

Appendix D

Wetland Supplement

740000

LSD 8 QS SE Sec 18 Twp 54 Rge 23 W4M

LSD 5 QS SW Sec 17 Twp 54 Rge 23 W4M

LSD 1 QS SE Sec 18 Twp 54 Rge 23 W4M

LSD 4 QS SW Sec 17 Twp 54 Rge 23 W4M

LSD 13 QS NW Sec 8 Twp 54 Rge 23 W4M

N

LEGEND

Bridge Replacement

Alberta Merged Wetland Inventory Class

Canadian Wetland Classification System Class

- Bog
- Fen
- Marsh
- Open Water
- Swamp

TITLE

ALBERTA MERGED WETLAND INVENTORY

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community Copyright Government of Alberta

PROJECTION

NAD 1983 CSRS UTM Zone 11N

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FIGURE	##
DATE	2024-03-22
PROJECT NO.	16547
AUTHOR	RG

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Enviro\16447_Figure_AMWI.mxd

Appendix E

Historical Resources Supplement

Steppe Consulting Inc.
554 19 Ave SW, Calgary, AB, T2S 0E2
Phone: 403-615-6325
Email: pemcneil@gmail.com

Gareth Spicer
Turtle Island CRM
5 Creston Crescent NW, Calgary AB, T2M 4J9

February 13th, 2024

RE: 18 Street over Horsehill Creek Bridge (B081) Replacement

Dear Gareth,

I have reviewed the construction plans for Alberta Transportation's planned replacement of the 18 Street bridge over Horsehill Creek. The proposed bridge replacement is located in northeast Edmonton on 18 Street NW approximately 300m north of the intersection with Horsehill Road. Constructed in 1961, the current bridge consists of an 8.5m long precast concrete slab supported by treated timber pile abutments. The site is located on the glacial peneplain north of the North Saskatchewan River valley. Satellite imagery and photographs of the site indicate that the Project site topography is flat, with Horsehill Creek having only being shallowly incised into the surround plain (Figure 1). The planned construction methods call for a maximum excavation of 0.6m below the creek bed, with driven steel piles used as supports with new abutments constructed approximately 1m behind the existing backwall. Overall, the excavation impact will be shallow, of small volume, and the driven pilings will not return subsurface material.

No palaeontological HRVs have been assigned to the proposed Project locality. Bedrock at this location is composed of the Late Cretaceous Horseshoe Canyon Formation. This Formation is known to be locally fossiliferous, with the HRV 4 Edmonton Water Treatment Plant Palaeo Locale located approximately 4.5km to the SE in the North Saskatchewan River valley. As the construction footprint for this Project is shallow, bedrock is not expected to be impacted. Surficial cover is mapped as 5 to 10m of glaciolacustrine sand and silt with occasional gravel. Glaciolacustrine deposits have low palaeontological potential for containing significant fossil resources. Several Quaternary HRV 4 sites are present close to the Project, including: Cloverbar Sand & Gravel, P01.3 (2.5km SSE on an incised part of Horsehill Creek), Horse Hill Pit General P80.42 (4.5km SEE in the North Saskatchewan River valley), and Twin Bridges Gravel Pit 80 P80.9 (6km east in the North Saskatchewan River valley). However, unlike the proposed Project location, these sites are associated with fluvial sand and gravel deposits in incised watercourses.

Given that the planned construction excavation will occur at shallow depths in glaciolacustrine sediments and that driven steel piles will be used to support the bridge deck, potential for

Steppe Consulting Inc.
554 19 Ave SW, Calgary, AB, T2S 0E2
Phone: 403-615-6325
Email: pemcneil@gmail.com

palaeontological impact is low. It is therefore recommended that no further palaeontological work be required.

Sincerely,

Paul E. McNeil, Ph.D.
President, Senior Consultant,
Steppe Consulting Inc.

Figure 1: Photograph of the proposed Alberta Transportation 18 Street over Horsehill Creek Bridge (B081) Replacement. Note the small incision into the surround flat plain. From: 935386 18 Street NW over Horsehill Creek Bridge (B081) Replacement DESCRIPTION OF WORK.

TURTLE ISLAND
CULTURAL RESOURCE MANAGEMENT INC

February 14, 2024

Historic Resources Management Branch
Old St. Stephen's College
8820-112th Street NW
Edmonton, Alberta
T6G 2P8

Re: Horsehill Creek Bridge Replacement (B081) Replacement - Historical Resources Act clearance

The City of Edmonton is proposing the replacement of a simple deck bridge at the 18 Street crossing of the Horse Hill Creek (Figure 1). ISL Engineering and Lands Services has been engaged to manage the construction of the replacement bridge. Built in the early 1960's, the current bridge consists of a cast concrete deck supported by treated timber piles intended for low tonnage, local use only. The City of Edmonton desires to obtain Historical Resource Act clearance for this development, and ISL Engineering has retained Turtle Island CRM to facilitate this application. The location of the proposed replacement bridge is not identified on Alberta Culture's current listing of Significant of Historic Resource sites and no previously recorded cultural resources sites are present in this area.

The proposed bridge development is located in level terrain spanning Horse Hill Creek. The creek channel has been impacted in this area by historic/contemporary cultivation and the construction of the 18 Street RoW berm and adjacent high tension power line. Horse Hill Creek is a small meandering water course and is not associated with a defined valley or relic terraces at the location of the bridge crossing. Likely owing to the 18 Street RoW, in combination with the general level terrain at the current bridge, the area of the proposed bridge includes areas poorly drained in association with the current creek channel. Although areas associated with the proposed development where intact sediment in located may be present, these sediment are likely shallow and isolated.

As currently planned, excavation related to construction will terminate between 50-100 cm below the level of the stream bed. The new abutments will be constructed approximately 1 m behind the existing abutment back walls. Bridge foundations will consist of driven steel piles without significant excavation. The area of excavations related to the proposed replacement bridge will be small and their impacts on preserved, potentially culture bearing sediments, limited.

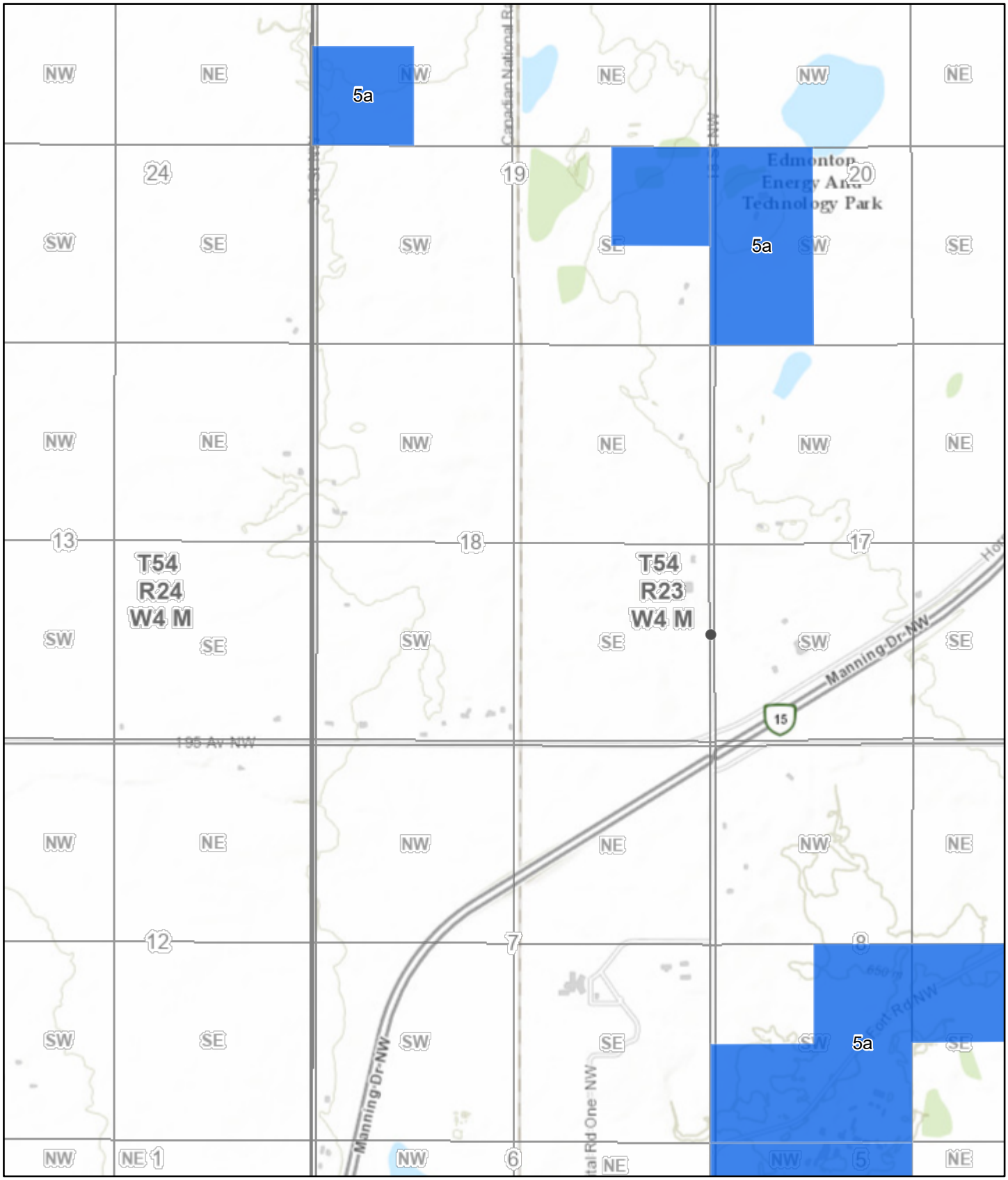
Based on the general observations outlined above, the potential that significant, previously unrecorded, cultural resource sites are located in the project area is limited. Therefore complex archaeological work including field assessment is not warranted for this project. A Section 31 clearance is recommended for the City of Edmonton's proposed 18 Street / Horse Hill Creek Bridge (B081) project. Don't hesitate to call if you have any questions or comments and thank you for considering Turtle Island CRM.

With best wishes,

Gareth Spicer
Principal Archaeologist
Turtle Island CRM

Figure 1: Project Area

Listing of Historic Resources - Historic Resource Values



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0 0.28 0.55 1.1 km

ATS Township Index Label Above Hydro

ATS Township Index Label Above Hydro

ATS Section with Road Allowance Label Below Hydro

ATS Section with Road Allowance Label Below Hydro

ATS Quarter Section with Road Allowance Label Below Hydro

ATS Quarter Section with Road Allowance Label Below Hydro

Appendix F

Wildlife Supplement

Fish and Wildlife Internet Mapping Tool (FWIMT)

(source database: Fish and Wildlife Management Information System (FWMIS))

Species Summary Report

Report Date: 15-Jan-2024 09:42

Species present within the current extent

Fish Inventory	Wildlife Inventory	Stocked Inventory
FATHEAD MINNOW	BARN SWALLOW	No Species Found in Search Extent
	EASTERN KINGBIRD	
	FISHER	
	GREAT BLUE HERON	
	LEAST FLYCATCHER	
	SANDHILL CRANE	
	SORA	

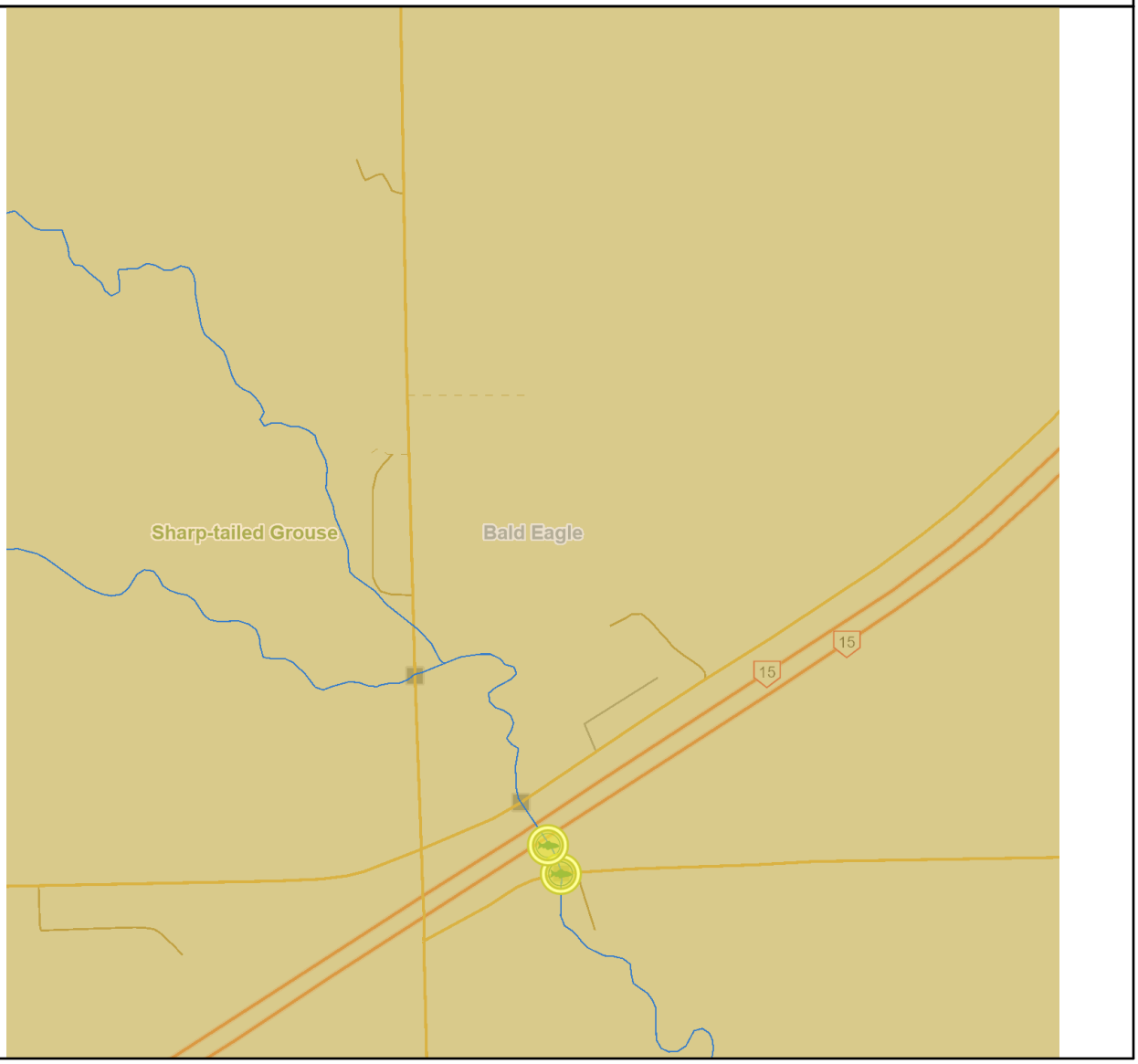
Buffer Extent

Centroid (X,Y)	Projection	Centroid (Qtr Sec Twp Rng Mer)	Radius or Dimensions
607732, 5944663	10-TM AEP Forest	SW 17 54 23 4	2 kilometers

Contact Information

For contact information, please visit:
https://www.alberta.ca/fisheries-and-wildlife-management-contacts.aspx

15-Jan-2024 09:42 **Map Results**



Appendix G

Field Photography

Photo plate #1: Barn swallow nest under Horsehills Bridge (53.6610091273, -113.368994143 [May 5, 2024])

Photo plate # 2: Moose scat observed approximately 100m SE of Horsehills bridge (May 5, 2024)

Photo plate #3: Antler tree rubs in wooded areas approximately 100m SE of Horsehills bridge.

Photo plate #4: Diverse vegetation and cover example (May 5, 2024)

Photo plate #5: Abandoned magpie sticknest (May 5, 2024)

Photo plate #6: Potential amphibian breeding pool, west of Horsehills bridge (53.6610091273, -113.368994143 [May 5, 2024])

Photo plate #7: View in wetland (July 4, 2024)
(12U 343481.92 m E/5948389.38 m N)

Photo plate #8: View north in wetland (July 4, 2024)
(12U 343474.58 m E/ 5948403.54 m N)

Photo plate #9: View south showing the wetland, from north of bridge on the west side of 18 Street (July 4, 2024)
(12U 343463.51 m E/ 5948489.98 m N)

Photo plate #10: View from on the bridge, of the west side. Canada Goose nest visible in foreground (May 15, 2024)
(12U 343463.12 m E/ 5948412.72 m N)

Photo plate #11: View of wetland indicators in soils (rusting, gleying) (May 15, 2024)
(12U 343474.58 m E/ 5948403.54 m N)

Photo plate #12: View of non-wetland adjacent habitat (May 15, 2024)
(12U 343480.58 m E/ 5948371.16 m N)

Photo plate #13: View of road side slope, south of the bridge (May 15, 2024)
(12U 343470.28 m E/ 5948381.63 m N)

Photo Plate #14: View upstream from bridge, showing drainage entering from the west (May 16, 2024)

Photo plate #15: Photo of bridge,looking upstream, showing large scour hole followed by small channel width downstream (May 16, 2024).

Photo plate #16: Showing upstream from bridge, showing channel constraint between field and 18 Street (May 16, 2024).

Photo plate #17:View downstream from bridge, showing smaller channel width and grass riparian area (May 16, 2024).

Photo plate #18: showing typical organic and silty substrates within channel (May 16, 2024).

Photo plate #19: view upstream towards bridge showing constrained channel width (May 16, 2024).

Photo plate #20: View downstream, where channel begins to increase in width towards Highway 15 (May 16, 2024).
(12U 343463.12 m E/ 5948412.72 m N)

Photo plate #21: View downstream, showing human disturbance, approximately 200 m downstream of Project area(May 16, 2024).

Photo plate #22: View upstream, showing human disturbance, approximately 200 m downstream of Project area (May 16, 2024).

Photo plate #23: View towards highway 15 culverts (May 16,2024).

Photo plate #24: View upstream from Horsehill Road NW crossing (May 16,2024.)

Photo plate #25: View of field scabious
(July 4,2024.) 343477.61 m E/ 5948492.52 m N

Photo plate #26: View of tansy (July 4,2024.) 343481.95 m E/ 5948467.88 m N

Photo plate #27: View of yellow toadflax
(July 4,2024.) 343482.28 m E/ 5948471.65 m N

Photo plate #28: View of upstream side of bridge (July 4,2024.)

Appendix H

Vegetation Supplement

740000

N

Ontario Broom Moss

Lime Silk Moss

long-leaved bluets

Lime Silk Moss

crowfoot violet

Creeping Ancylid

clammy hedge-hyssop

Canada rice grass

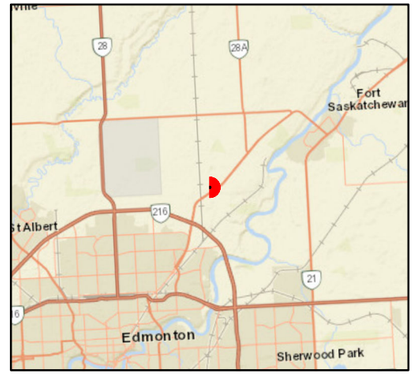
smooth sweet cicely

Creeping Ancylid

crowfoot violet

5950000

740000



LEGEND

- ACIMS Occurence Records
- Bridge Replacement
- Study Area (2km buffer)

TITLE

ACIMS OCCURENCE RECORDS

PROJECT

18 STREET OVER HORSEHILL CREEK BRIDGE REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS UTM Zone 11N

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1:50,000 KM

FIGURE	#
DATE	2024-02-05
PROJECT NO.	16547
AUTHOR	RG

Document Path: V:\Projects\16547_18_St_Horsehill_Bridge_Replacement\Enviro\16547_Figure_x_ACIMS.mxd

Table H-1: Vegetation Species Observed During the 2024 Field Assessments (May 15, 2024 and July 4, 2024)

Scientific Name	Common Name	Provincial Rank	Plot					
			1	2	3	4	5	6
Trees and Shrubs								
Acer negundo	Manitoba maple	SU						
Amelanchier alnifolia	saskatoon	S5						
Cornus sericea	red-osier dogwood	S5						
Salix interior	sandbar willow	S5						
Salix planifolia	flat-leaved willow	S5						
Symphoricarpos occidentalis	buckbrush	S5						
Salix sp.	Willow species	-						x
Populus tremuloides	aspen	S5						
Populus balsamifera	balsam poplar	S5						
Ribes oxyacanthoides	northern gooseberry	S5						
Ribes hudsonianum	northern black currant	S5						
Symphoricarpos albus	snowberry	S5			x			
Cornus sericea	red-osier dogwood	S5						

Rosa woodsii	common wild rose	S5						
Forbs								
Anemonastrum canadense	Canada anemone	S5						
Artemisia ludoviciana	prairie sagewort	S5						
Callitriche palustris	spring water-starwort	S5						
Ceratophyllum demersum	hornwort	S4						
Cicuta maculata	water-hemlock	S5						
Epilobium palustre	marsh willowherb	S4						
Equisetum pratense	meadow horsetail	S5						
Galium aparine	cleavers	SNA						
Galium boreale	northern bedstraw	S5						
Galium labradoricum	Labrador bedstraw	S4						
Geum aleppicum	yellow avens	S5						
Hedysarum americanum	alpine hedysarum	S5						
Lemna minor	small duckweed	SNA						
Maianthemum stellatum	star-flowered Solomon's-seal	S5						
Mentha canadensis	wild mint	S5						
Plantago major	common plantain	SNA						
Potentilla anserina	silverweed	S5						

Juncus balticus	wire rush	S5						
Poa palustris	fowl bluegrass	S5						
Poa pratensis	Kentucky bluegrass	S5						
Scirpus microcarpus	small-fruited bulrush	S5						
Eleocharis palustris	creeping spike-rush	S5						
Weeds								
Bromus inermis	smooth brome	SNA		x	x	x		
Chenopodium album	lamb's-quarters	SNA						
Taraxacum officinale	common dandelion	SNA						
Cirsium arvense	**creeping thistle**	**SNA**			x	x		
Sonchus arvensis	**perennial sow-thistle**	**SNA**		x		x		
Knautia arvensis	**field scabious**	**SNA**						
Linaria vulgaris	**common toadflax**	**SNA**						
Tanacetum vulgare	**common tansy**	**SNA**						
Medicago sativa	alfalfa	SNA				x		
Trifolium sp.	Clover species	-			x			
Trifolium hybridum	alsike clover	SNA						

Noemclature and S-rank: Sourced from ACIMS 2022

Notes: 1 Bold denotes a Noxious species in the Alberta Weed Act (Government of Alberta 2010)

2 Grey Highlight denotes a Prohibited Noxious species in the Alberta Weed Act (Government of Alberta 2010)

3 Nomenclature is per ACIMS

Notes:

1. S1 (Critically Imperiled): Five or fewer occurrences, or especially vulnerable to extirpation due to other factor(s).
   S2 (Imperiled): Twenty or fewer occurrences, or vulnerable to extirpation due to other factor(s).
   S3 (Vulnerable): One hundred or fewer occurrences, or somewhat vulnerable due to other factors, such as restricted range, relatively small population sizes, or other factor(s).
   S4 (Apparently Secure): Fairly low risk of extinction in the jurisdiction due to extensive range and/or many populations or occurrences, but with possible concern as a result of recent declines, threats or other factors.
   S_S_: Denotes the range of uncertainty about the status rank of the element.
   SNA: Not Applicable because the species or ecosystems is not a suitable target for conservation activities (e.g., introduced species).
   SU (Unrankable): Due to lack of information or substantially conflicting information.
   B (Breeding Qualifier): Refers to the breeding population of the species.
   N (Non-breeding): Refers to the non-breeding population of the species.
   H (Possibly extirpated): known only from historical records but still some hope of rediscovery.
   T (Intraspecfic Taxon): The status of subspecies or varieties are indicated by the T-Rank following the global rank.
   Q (questionable Taxonomy): Distinctiveness of this entity as a taxon at the current level is questionable.
   NR (not ranked): Rank not yet assessed
2. G ranks are similar to S ranks, on a Global scale.

Table Appendix H1: Tracked Vascular Plants in the Central Parkland Natural Subregion – June 2022 (ACIMS)

Scientific Name	Common Name	S_RANK
Almutaster pauciflorus	Marsh Alkali Aster	S3
Andersonglossum boreale	wild comfrey	S1
Bolboschoenus fluviatilis	river bulrush	S1
Botrychium ascendens	ascending grape fern	S3
Botrychium campestre	field grape fern	S3
Botrychium hesperium	western moonwort	S3
Botrychium lineare	Narrow-leaved Moonwort	S1
Botrychium pallidum	pale moonwort	S2
Botrychium simplex var. compositum	Western Least Moonwort	S2
Botrychium spathulatum	spatulate moonwort	S3
Bromus latiglumis	Canada brome	S1
Callitriche stenoptera	narrow-winged water-starwort	SU
Carex crawei	Crawe's sedge	S3
Carex vulpinoidea	Fox Sedge	S3
Chenopodium atrovirens	dark-green goosefoot	S1
Chenopodium fremontii	Fremont's goosefoot	S2
Corispermum americanum var. americanum	American bugseed	S2
Corispermum hookeri var. hookeri	Hooker's bugseed	S2
Corispermum pallasii	Pallas' bugseed	S2
Cryptantha kelseyana	Kelsey's cat's eye	S3
Dichanthelium leibergii	Leiberg's millet	S1
Dichanthelium wilcoxianum	Wilcox's panicgrass	S2
Doellingeria umbellata var. pubens	flat-topped white aster	S3
Echinochloa muricata var. microstachya	rough barnyard grass	S1
Eleocharis ovata	ovate spikerush	S1
Erythranthe geyeri	Geyer's yellow monkeyflower	S1
Gentiana fremontii	marsh gentian	S3
Gratiola neglecta	clammy hedge-hyssop	S3
Houstonia longifolia	long-leaved bluets	S3
Juncus nevadensis	Nevada rush	S1
Lactuca biennis	tall blue lettuce	S3
Lobelia spicata	spiked lobelia	S1
Luzula comosa var. laxa	limp Pacific woodrush	SU
Lysimachia hybrida	lance-leaved loosestrife	S3
Malaxis paludosa	bog adder's-mouth	S2S3
Marsilea vestita	hairy pepperwort	S3
Mirabilis linearis	narrowleaf umbrellawort	S2
Muhlenbergia andina	foxtail muhly	S1S2
Najas flexilis	slender naiad	S3
Oenothera serrulata	shrubby evening-primrose	S3
Osmorhiza longistylis	smooth sweet cicely	S3
Pellaea glabella ssp. simplex	smooth cliffbrake	S2
Piptatheropsis canadensis	Canada rice grass	S2
Potentilla lasiodonta	sandhills cinquefoil	S3
Potentilla plattensis	low cinquefoil	S2
Rhynchospora capillacea	slender beak-rush	S2
Rorippa curvipes	blunt-leaved watercress	S3
Ruppia cirrhosa	widgeon-grass	S3
Schedonnardus paniculatus	tumble grass	S2
Shinnersoseris rostrata	annual skeletonweed	S3
Viola pedatifida	crowfoot violet	S3
Wolffia columbiana	Columbia watermeal	S2

Source: ACIMS 2022

Table Appendix H2: Tracked Fungi in the Central Parkland Natural Subregion – June 2022 (ACIMS)

Scientific Name	Common Name	S_RANK
Acarospora socialis	bright cobblestone lichen	SU
Acarospora veronensis	cobblestone lichen	SU
Bilimbia sabuletorum	Six-celled Moss Dot Lichen	S2S4
Caloplaca ahtii	firedot lichen	SU
Caloplaca decipiens	orange firedot lichen	SU
Caloplaca pyracea	firedot lichen	SU
Caloplaca subsoluta	firedot lichen	SU
Caloplaca variabilis	variable orange lichen	SU
Candelariella rosulans	goldspeck lichen	SU
Cetraria arenaria	sand-loving Iceland lichen	S1S2
Circinaria contorta	chiseled sunken disc lichen	SU
Lecania dubitans	bean-spored rim-lichen	SU
Lecanora caesiorubella ssp. saximontana	frosted rim-lichen	SU
Lecanora flowersiana	Flowers' rim lichen	SU
Lecanora hybocarpa	bumpy rim-lichen	SU
Lecidella latypiza	disk lichen	SU
Lichinella nigritella	Black Rocklicorice Lichen	SU
Micarea melaena	dot lichen	S2S4
Myriolecis crenulata	rim-lichen	SU
Myriolecis dispersa	mortar rim-lichen	SU
Peltigera horizontalis	flat fruited pelt lichen	S2S4
Phaeophyscia hirsuta	Hairy shadow lichen	S2
Phaeophyscia nigricans	Powder-headed Shadow Lichen	S2S3
Phaeophyscia sciastra	dark shadow lichen	S3
Physcia alnophila	Outward-looking Rosette Lichen	SU
Physcia dimidiata	Exuberant Rosette Lichen	S2
Physciella chloantha	cryptic rosette lichen	SU
Physconia enteroxantha	yellow-edged frost lichen	S3
Physconia isidiigera	bottlebrush frost lichen	S2
Physconia perisidiosa	crescent frost lichen	S3
Porpidia zeoroides		SU
Pseudevernia consocians	common antler lichen	S2
Psora tuckermanii	brown-eyed scale lichen	S2S3
Ramalina farinacea	dotted ramalina	S3
Rinodina castanomelodes	pepper-spore lichen	SU
Trapeliopsis flexuosa	mottled-disk lichen	SU
Verrucaria muralis	speck lichen	SU
Xanthocarpia lactea	firedot lichen	SU
Xanthomendoza mendozae	orange foliose lichen	SU
Xanthomendoza montana	Small-footed Sunburst Lichen	S3
Xylographa parallela	black woodscript lichen	SU

Source: ACIMS 2022

Table Appendix H3: Tracked Rare communities in the Central Parkland Natural Subregion – June 2022 (ACIMS)

Scientific Name	Common Name	S_RANK
Amphiscirpus nevadensis - (Triglochin maritima) emergent marsh	Nevada bulrush - (seaside arrow-grass) emergent marsh	S2S3
Betula neoalaskana - Picea glauca / Salix discolor / Equisetum arvense swamp forest	Alaska birch - white spruce / pussy willow / common horsetail swamp forest	S1S2
Calamovilfa longifolia - Hesperostipa comata Grassland	sand grass - needle-and-thread grassland	S3
Calamovilfa longifolia - Sporobolus cryptandrus dune community	sand grass - sand dropseed dune community	S2S3
Distichlis stricta - Pascopyrum smithii meadow	salt grass - western wheat grass meadow	S2
Elaeagnus commutata - Prunus virginiana / Carex siccata shrubland	silverberry - chokecherry / hay sedge shrubland	S2S3
Elaeagnus commutata / Festuca hallii	silverberry / plains rough fescue	S2S3
Festuca hallii - Calamovilfa longifolia grassland	plains rough fescue - sand grass grassland	S1
Festuca hallii - Hesperostipa curtiseta grassland	plains rough fescue - western porcupine grass grassland	S2S3
Festuca hallii - Koeleria macrantha / Juniperus horizontalis / forb grassland	plains rough fescue - June grass / juniper / forb grassland	S2
Festuca hallii grassland	plains rough fescue grassland	S1
Juniperus horizontalis / (Koeleria macrantha) / Cladonia arbuscula ssp. mitis stabilized dune community	creeping juniper / (June grass) / green reindeer lichen stabilized dune community	S1S2
Larix laricina - Picea mariana / Cornus stolonifera - Rubus idaeus rich fen	tamarack - black spruce / red-osier dogwood - wild red raspberry rich fen	S1S2
Muhlenbergia asperifolia - Amphiscirpus nevadensis - Distichlis stricta meadow	scratch grass - Nevada bulrush - salt grass meadow	S1S2
Picea mariana / Cornus stolonifera / feathermoss rich fen	black spruce / red-osier dogwood / feathermoss rich fen	S1S2
Populus balsamifera / Viburnum opulus / Matteuccia struthiopteris forest	balsam poplar / high-bush cranberry / ostrich fern forest	S1S2
Populus tremuloides / Juniperus horizontalis / Carex siccata woodland	aspen / creeping juniper / hay sedge woodland	S2S3
Puccinellia nuttalliana Salt Marsh	Nuttall's salt-meadow grass community	S3?
Salicornia rubra Salt Flat	samphire emergent marsh	S2
Schizachyrium scoparium - Calamovilfa longifolia grassland	little bluestem - sand grass grassland	S2
Sparganium eurycarpum emergent aquatic vegetation	giant bur-reed emergent aquatic vegetation	S1S2
Spartina gracilis - (Pascopyrum smithii) saline meadow	alkali cord grass - (western wheat grass) saline meadow	S2S3
Sporobolus cryptandrus semi-active dune	sand dropseed semi-active dune	S2
Triglochin maritima emergent marsh	seaside arrow-grass emergent marsh	S2?

Source: ACIMS 2022

Table Appendix H4: Tracked non-vascular in the Central Parkland Subregion – June 2022 (ACIMS)

Scientific Name	Common Name	S_RANK
Amblyodon dealbatus	short-tooth hump moss	S3
Callicladium haldanianum	beautiful branch moss	S2
Conocephalum salebrosum	cat-tongue liverwort	S2S4
Dicranum ontariense	Ontario Broom Moss	S1S2
Didymodon fallax	False Beard Moss	S2S3
Didymodon tophaceus	blunt-leaved hair moss	S2S3
Drepanocladus longifolius	Long-leaved Hook Moss	SU
Entodon concinnus	Lime Silk Moss	S1S2
Entodon schleicheri	Schleicher's silk moss	S2S3
Grimmia donniana	Donn's grimmia moss	S1S2
Haplocladium virginianum	Virginia Haplocladium Moss	S1S2
Hennediella heimii	Heim's Chain-teeth Moss	S2S3
Hygroamblystegium varium var. varium		S1S2
Leskea gracilescens	Common Leske's Moss	S2
Leskea obscura	Blunt Leske's Moss	S1
Leskea polycarpa	Many-fruited Leske's Moss	S1
Limprichtia cossonii	Cosson's Hook Moss	SU
Mannia fragrans	Fragrant Macewort	SU
Mannia pilosa	Small Macewort	SU
Physcomitrium hookeri	bladder-cap moss	S2
Pohlia atropurpurea	Purple Nodding Moss	S2
Pseudocampylium radicale	campylium moss	S3
Pterygoneurum kozlovii	alkaline wing-nerved moss	S2
Ptychostomum cernuum	Swamp Bryum	S1S2
Rhodobryum ontariense	Ontario Rhodobryum moss	S1S2
Riccardia chamedryfolia	Jagged Germanderwort	SU
Riccardia multifida	Delicate Germanderwort	SU
Riccia cavernosa	Cavernous Crystalwort	S2S4
Riccia fluitans	Floating Crystalwort	SU
Ricciocarpos natans	Purple-fringed Riccia	SU
Scapania glaucocephala var. glaucocephala	glaucous-headed liverwort	S2S4
Sciuro-hypnum hylotapetum	Woodsy Ragged Moss	S1S3
Thuidium philibertii	Philibert's Fern Moss	S1S2
Tortula cernua	narrow-leafed chain-teeth moss	S1

Source: ACIMS 2022

Notes:

1. S1 (Critically Imperiled): Five or fewer occurrences, or especially vulnerable to extirpation due to other factor(s).
   S2 (Imperiled): Twenty or fewer occurrences, or vulnerable to extirpation due to other factor(s).
   S3 (Vulnerable): One hundred or fewer occurrences, or somewhat vulnerable due to other factors, such as restricted range, relatively small population sizes, or other factor(s).
   S4 (Apparently Secure): Fairly low risk of extinction in the jurisdiction due to extensive range and/or many populations or occurrences, but with possible concern as a result of recent declines, threats or other factors.
   S_S_: Denotes the range of uncertainty about the status rank of the element.
   SNA: Not Applicable because the species or ecosystems is not a suitable target for conservation activities (e.g., introduced species).
   SU (Unrankable): Due to lack of information or substantially conflicting information.
   B (Breeding Qualifier): Refers to the breeding population of the species.
   N (Non-breeding): Refers to the non-breeding population of the species.
   H (Possibly extirpated): known only from historical records but still some hope of rediscovery.
   T (Intraspecfic Taxon): The status of subspecies or varieties are indicated by the T-Rank following the global rank.
   Q (questionable Taxonomy): Distinctiveness of this entity as a taxon at the current level is questionable.
   NR (not ranked): Rank not yet assessed

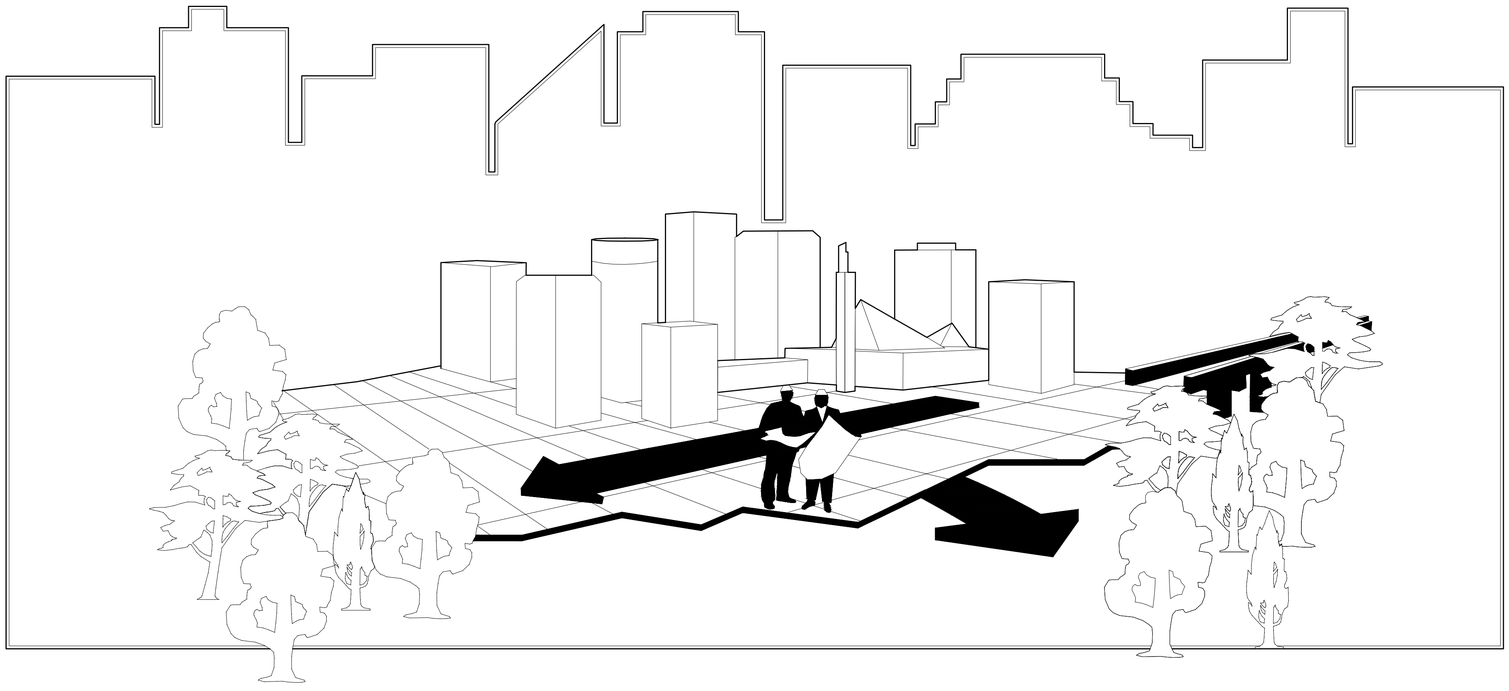
Appendix I

Bridge 60% Design Drawings

THE CITY OF Edmonton

INTEGRATED INFRASTRUCTURE SERVICES

INFRASTRUCTURE DELIVERY BRANCH



ISSUED FOR REVIEW

18 STREET OVER HORSEHILLS CREEK

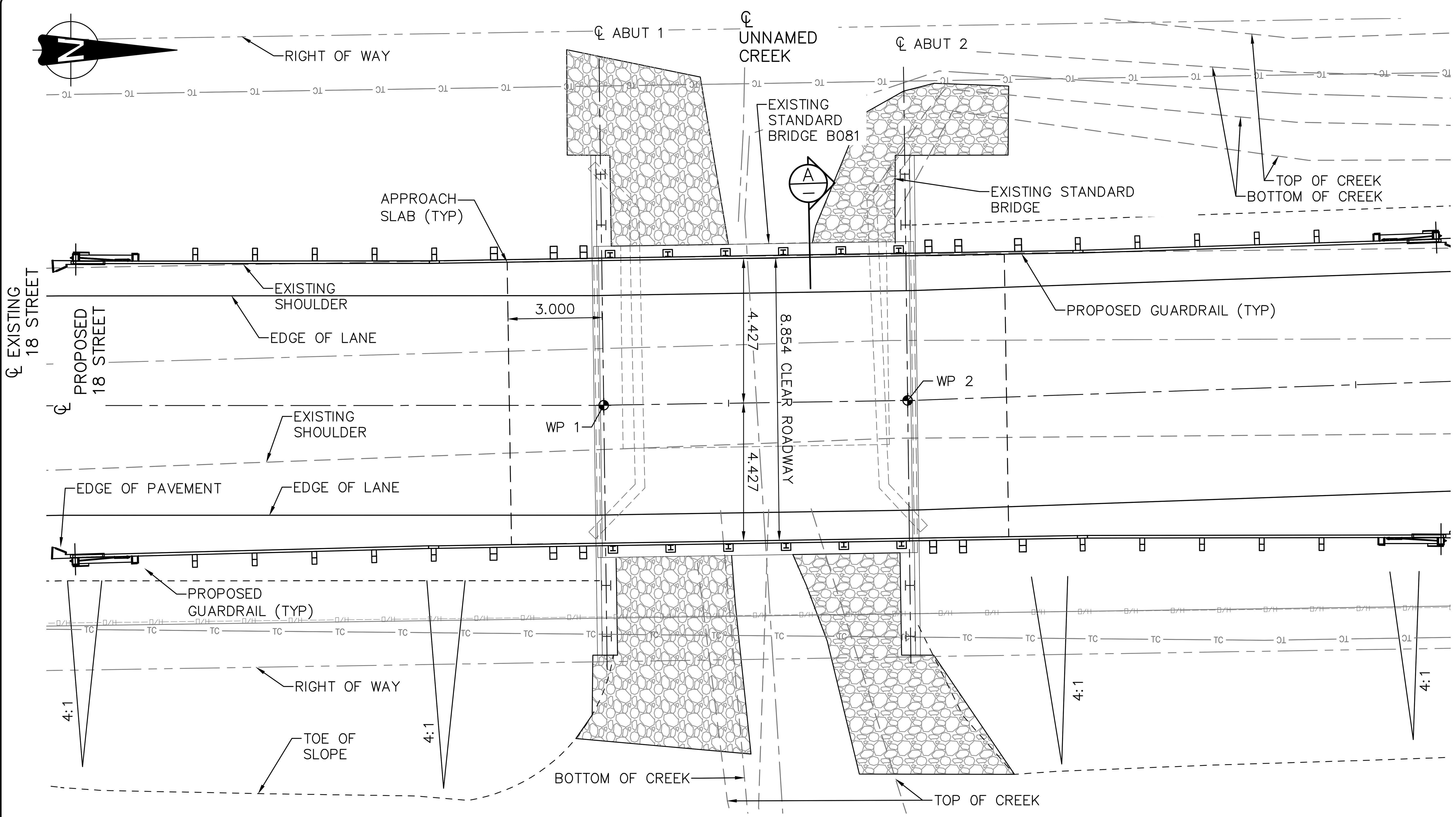
BRIDGE B081

TRANSPORTATION INFRASTRUCTURE DELIVERY DATE

BRIDGE ENGINEERING DATE
CITY OPERATION DEPARTMENT

DRAWING **S018 251 001**

ISL



PLAN

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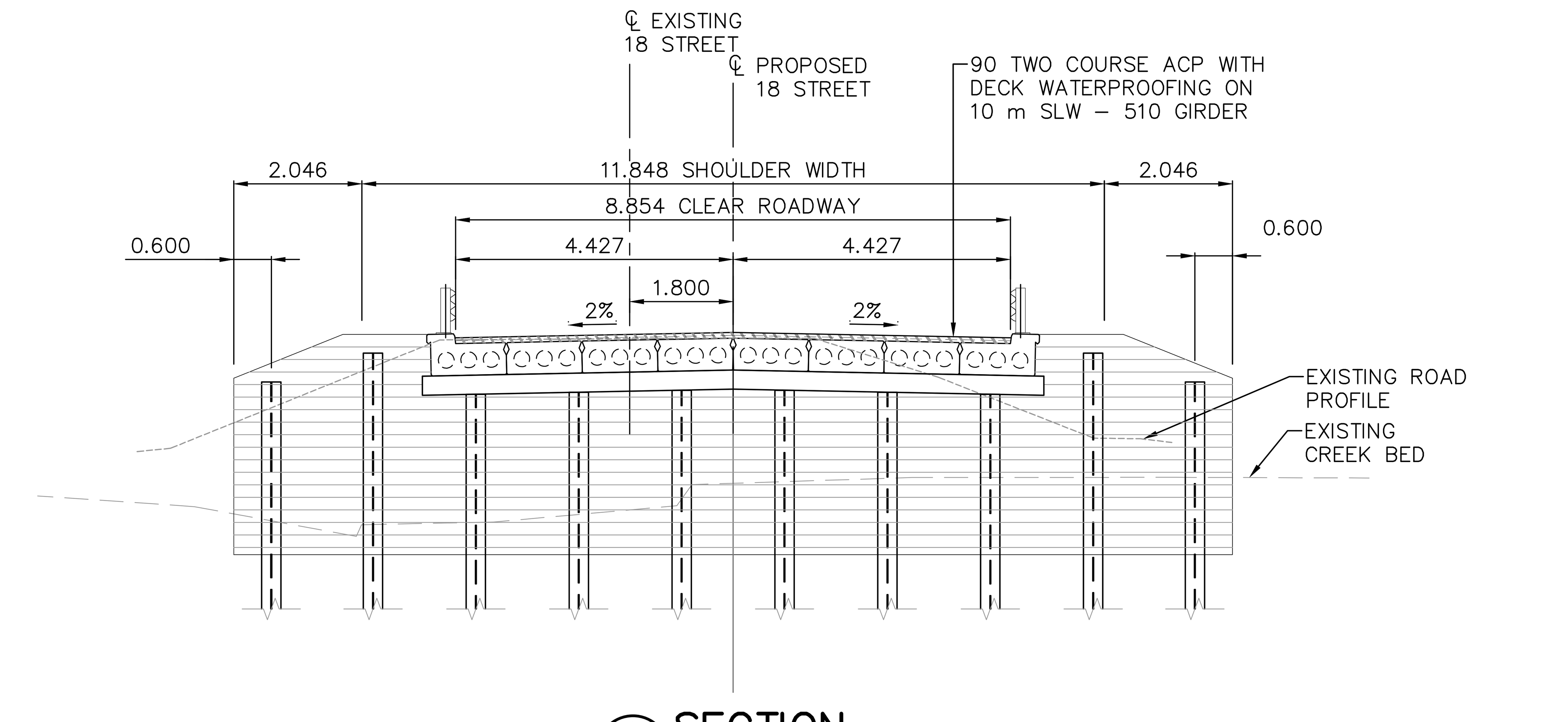


(A) SECTION

1:50

WORK POINTS (WP) TABLE			
WP	ELEVATION	NORTHING	EASTING
1	652.942	5947767.151	41712.729
2	652.845	5947776.839	41712.576

GENERAL NOTES:

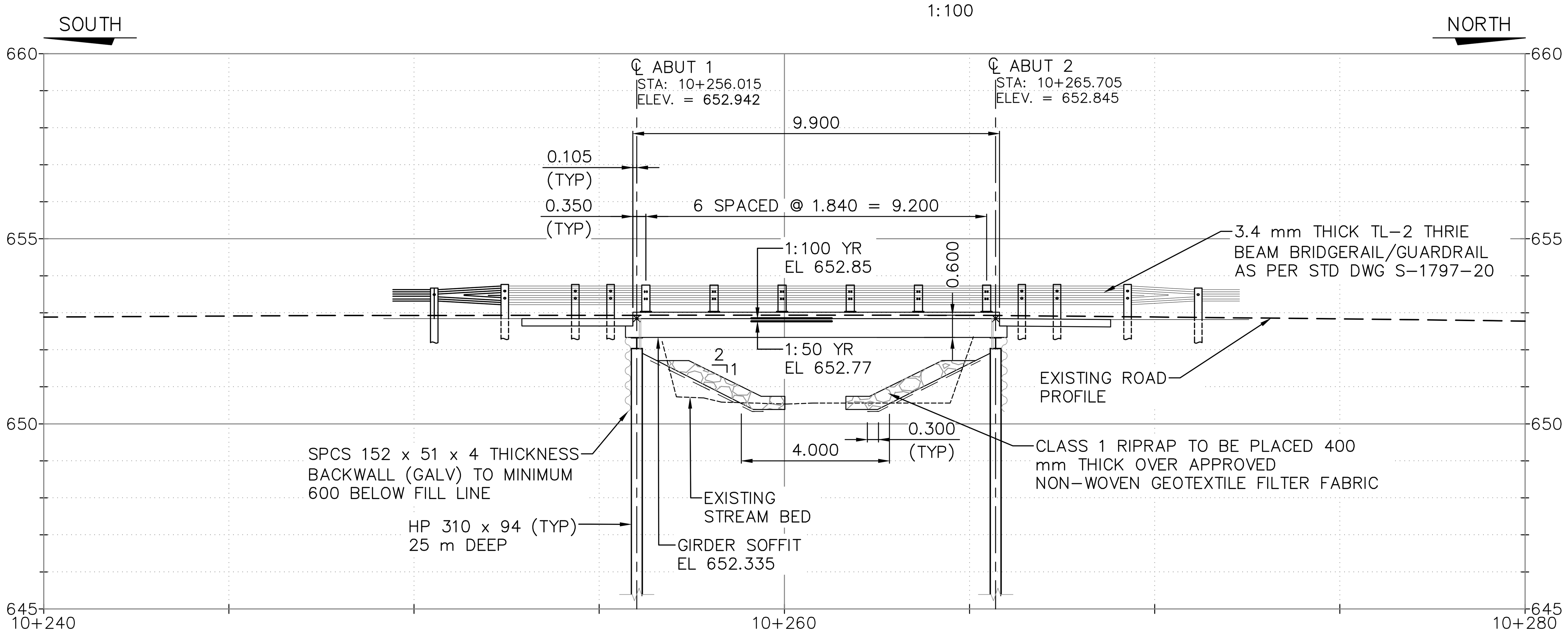
- ALL DIMENSIONS ARE SHOWN IN METERS UNLESS NOTED OTHERWISE
- UNDERGROUND UTILITY LINES SHOWN ARE APPROXIMATE ONLY. CONTRACTOR TO LOCATE AND CONFIRM LOCATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING WORK.
- GIRDER LENGTHS SHOWN ARE MEASURED ALONG BOTTOM FLANGE AND ARE CORRECT AT 20°C
- PRECAST SUPPLIERS SHALL MAKE ALLOWANCE FOR PRESTRESS SHORTENING, SHRINKAGE AND CREEP UP TO THE TIME OF GIRDER ERECTION
- DETAILS AND NOTES SHOWN ON DRAWINGS S–1824–12, S–1825–12, S–1826–12, S–1827–12, S–1836–12, AND S–1837–12 SHALL GOVERN WHEN SIMILER DETAILS OR NOTES ARE SHOWN ON DRAWINGS S–1753–08, S–1755–08, AND S–1756–08
- FOR DRAWING S–1755–08 REPLACE CLEAR ROADWAY (GIRDERS/SPAN) 8940 (8) WITH 8848 (8) AND REPLACE EXTERIOR GIRDER LOCATION FROM CL BRIDGE AT SPILL THROUGH 0 SKEW 4859 WITH 4884
- THE UPPER 1 m OF EXCAVATED SOIL SHOULD BE TREATED AS CONTAMINATED SOIL AND SHALL BE DISPOSED OFFSITE AT AN APPROPRIATE FACILITY.

(P) BRIDGE PLAQUE

NTS

SHEET	DESCRIPTION	DRAWING
15	STANDARD WATERPROOFING SYSTEM FOR DECK AND ABUTMENT – SHEET 3	S–1840–20
14	STANDARD WATERPROOFING SYSTEM FOR DECK AND ABUTMENT – SHEET 2	S–1839–20
13	STANDARD WATERPROOFING SYSTEM FOR DECK AND ABUTMENT – SHEET 1	S–1838–20
12	TL–2 THRIE BEAM BRIDGERAIL IN 75 MM HIGH CURB WITH STRONG POST W–BEAM GUARDRAIL	S–1797–20
11	SL PRECAST GIRDER BRIDGES WITH STEEL SUBSTRUCURES SHEET 4	S–1756–08
10	SL PRECAST GIRDER BRIDGES WITH STEEL SUBSTRUCURES SHEET 3	S–1755–08
9	SL PRECAST GIRDER BRIDGES WITH STEEL SUBSTRUCURES SHEET 1	S–1753–08
8	PRESTRESSED CONCRETE SLW–510 DETAILS SHEET 2	S–1837–12
7	PRESTRESSED CONCRETE SLW–510 DETAILS SHEET 1	S–1836–12
6	PRESTRESSED CONCRETE 10 m SLW–510 SKEWED GIRDER REINFORCEMENT	S–1827–12
5	PRESTRESSED CONCRETE 10 m SLW–510 INTERIOR AND EXTERIOR GIRDER LAYOUTS	S–1826–12
4	PRESTRESSED CONCRETE 10 m SLW–510 EXTERIOR GIRDER	S–1825–12
3	PRESTRESSED CONCRETE 10 m SLW–510 INTERIOR GIRDER	S–1824–12
2	INFORMATION SHEET	S018 251 S02
1	GENERAL LAYOUT	S018 251 S01

INDEX



ISSUED FOR REVIEW
AUG 14, 2024
ISL Engineering and Land Services

ELEVATION

1:100

NO.	REVISIONS	BY	DATE	APP'D
7	-	-	-	-
6	-	-	-	-
5	-	-	-	-
4	-	-	-	-
3	-	-	-	-
2	-	-	-	-
1	-	-	-	-

PROGRAM NO. -
CONTRACT NO. -

NO. | ISSUE | BY | DATE

CONSTRUCTION RETURN
CONTRACTOR
SURVEYOR
DATE
FILE NUMBER
CONSTRUCTION ENGINEER DATE
GENERAL SUPERVISOR DATE

DEPARTMENT / BRANCH | APPROVAL | DATE

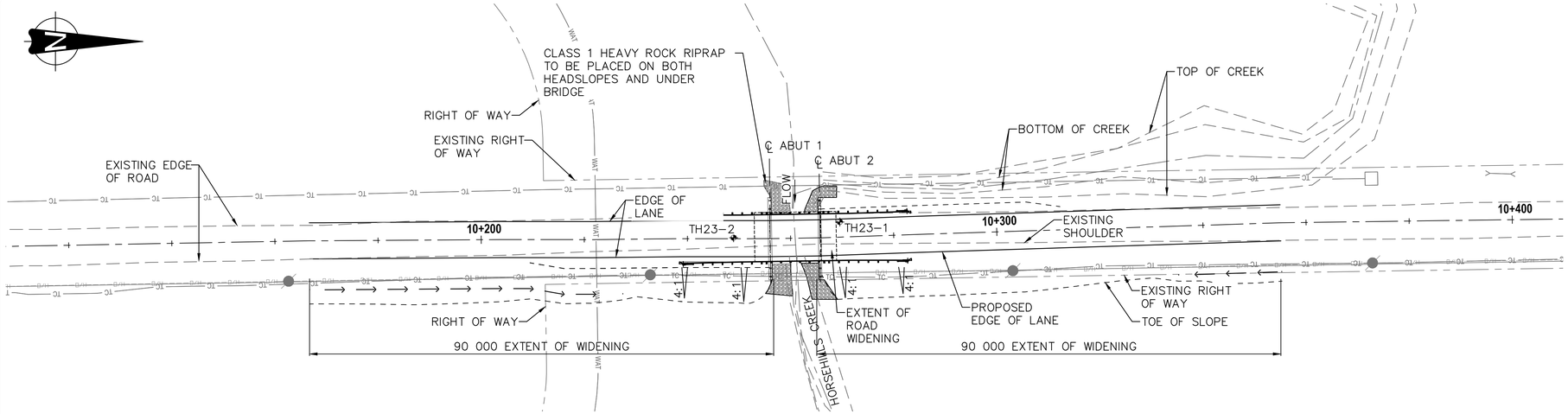
SURVEY: BY CONSULTANT
JOB NO.: 16547
SCALE HOR: AS SHOWN
VER: AS SHOWN

DRAWN: DL — DATE 2024-08-15
DESIGNED: AJ — DATE 2024-08-15
CHECKED: GK — DATE 2024-08-15

Edmonton — INTEGRATED INFRASTRUCTURE SERVICES, INFRASTRUCTURE DELIVERY

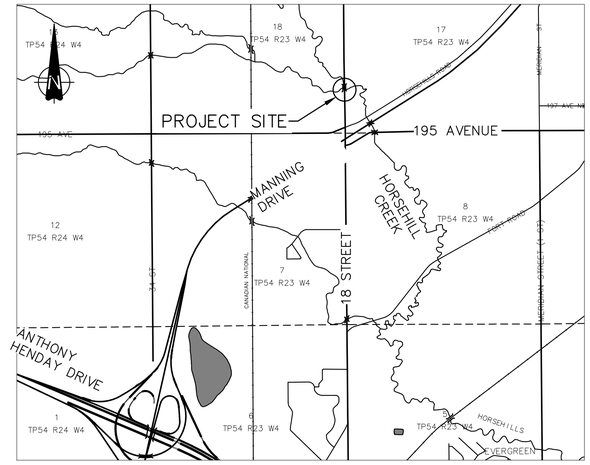
PROJECT: **18 STREET OVER HORSEHILLS CREEK**
BRIDGE B081
GENERAL LAYOUT

DRAWING: **S018 251 S01**



SITE PLAN

1:500



SITE – MAP

1:25 000

TEST HOLE TH23.02
STA 10+269.657
N 5947780.6850
E 41709.4880
EL 652.935
2023-11-20

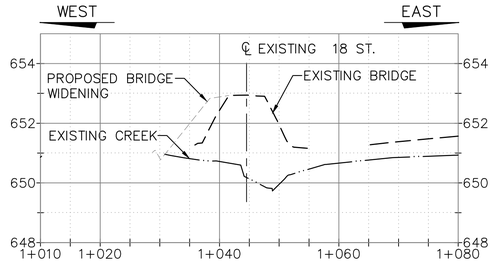
N13	0.0 ASPHALT (FILL)
	0.15 CLAY FILL
N11	2.20 CLAY
N7	3.81 CLAY TILL
	5.94 CLAY
N20	6.35 SAND
N13	6.60 CLAY TILL ▽WATER @ 8.5
N8	
N22	9.91 CLAY SHALE
N20	11.58 SAND
N38	13.55 CLAY TILL
	14.37 SAND
N28 N11	16.76 CLAY TILL
N21 N26 N13 N22 N13 N24	25.6 END OF TEST HOLE

TEST HOLE TH23.01
STA 10+248.957
N 5947760.0890
E 41712.5260
EL 652.908
2023-11-21

N14	0.0 ASPHALT (FILL)
	0.2 ORGANIC CLAY
N11	1.89 CLAY
N6	4.19 CLAY TILL
	5.10 SAND
N28	6.12 CLAY TILL
N12	7.49 SAND ▽WATER @ 8.2
N7	7.70 CLAY TILL
	9.17 SAND
N14	11.67 CLAY TILL
N13	11.97 SAND
N18	12.67 CLAY TILL
N21	14.25 SAND
N25	15.29 CLAY TILL
N25 N20 N34 N19 N30 N16	27.1 END OF TEST HOLE

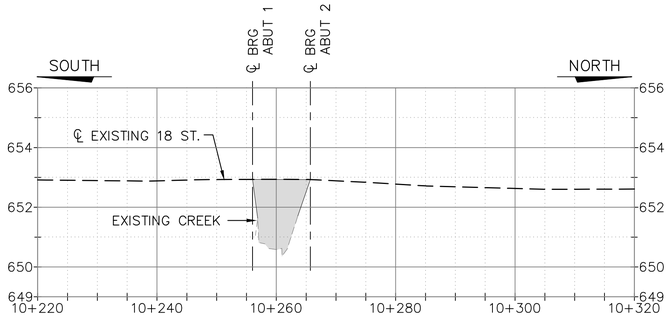
BOREHOLE LOG

1:200



STREAM PROFILE

H 1:100
V 1:20



ROADWAY PROFILE

H 1:100
V 1:20

ISSUED FOR REVIEW
AUG 14, 2024
ISL Engineering and Land Services

SURVEY INFORMATION

****

GENERAL NOTES

- ALL DIMENSIONS ARE SHOWN IN METERS UNLESS NOTED OTHERWISE
- ROADWAY ELEVATIONS ARE GIVEN TO TOP OF FINISHED CENTRE LINE CROWN

DESIGN NOTES

- ROADWAY STANDARD PER CITY OF EDMONTON STANDARD DRAWINGS
- CAN/CSA –S6 – 2019 SPECIFICATIONS
- LIVE LOAD: CL–800, CLASS A HIGHWAY
  ABUTMENT PILE LOADS:
  DL = 110 kN
  MAX SERVICE LOAD = 340 kN
  MAX FACTORED LOAD = 525 kN

GEOTECHNICAL

- ALL GEOTECHNICAL INFORMATION PROVIDED FOR THIS PROJECT HAS BEEN COMPILED FOR DESIGN PURPOSES ONLY. DESIGN PURPOSES ONLY. WHILE IT IS BELIEVED TO CORRECTLY REPRODUCE OR SUMMARIZE OBSERVATIONS MADE DURING TESTING, IT IS VALID ONLY FOR THE PRECISE LOCATIONS SHOWN, AND IS NOT CONSTRUED AS GUARANTEEING THE ACTUAL MATERIALS AND CONDITIONS EXISTING THROUGHOUT THE SITE. THE TESTING METHODS USED MAY NOT HAVE DETERMINED THE PRESENCE, ABSENCE OR EXTENT OF BOULDERS, HARD OR SOFT FORMATIONS, WATER TABLES, ARTESIAN CONDITIONS AND OTHER VARIABLES. IT IS THE RESPONSIBILITY OF OTHERS USING THIS INFORMATION TO ENSURE THAT IT IS ADEQUATE FOR THEIR PURPOSES, OR TO SUPPLEMENT IT WITH ADDITIONAL INFORMATION.
- TEST HOLE LOGS ARE SHOWN FOR INFORMATION ONLY AND ARE BASED GEOTECHNICAL INVESTIGATION REPORT PREPARED BY THURBER ENGINEERING LTD. "18 STREET NW OVER HORSEHILL CREEK BRIDGE B081 REPLACEMENT GEOTECHNICAL INVESTIGATION REPORT" DATED MAY 06, 2024

HYDROTECHNICAL

- DRAINAGE AREA = 78 km^2
- DESIGN DISCHARGE 1/50 YEARS FLOOD EVENT = 27.3 m^3/s
- DESIGN DISCHARGE 1/100 YEARS FLOOD EVENT = 41.6 m^3/s
- DESIGN FLOOD VELOCITY AT BRIDGE = 2.0 m/s

UTILITIES

- UNDERGROUND UTILITY LINES SHOWN ARE APPROXIMATE ONLY. CONTRACTOR TO LOCATE AND CONFIRM LOCATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING WORK.

NO.	REVISIONS	BY	DATE	APP'D
7	-	-	-	-
6	-	-	-	-
5	-	-	-	-
4	-	-	-	-
3	-	-	-	-
2	-	-	-	-
1	-	-	-	-

NO.	ISSUE	BY	DATE

PROGRAM NO.
CONTRACT NO.

CONSTRUCTION RETURN
CONTRACTOR
SURVEYOR
DATE
FILE NUMBER
CONSTRUCTION ENGINEER DATE
GENERAL SUPERVISOR DATE

ISL

DATE

DEPARTMENT / BRANCH	APPROVAL	DATE

- -
- -

SURVEY: BY CONSULTANT
JOB NO.: 16547
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HOR 0
AS SHOWN
VER 0

DRAWN DL DATE 2024-08-15
DESIGNED AJ DATE 2024-08-15
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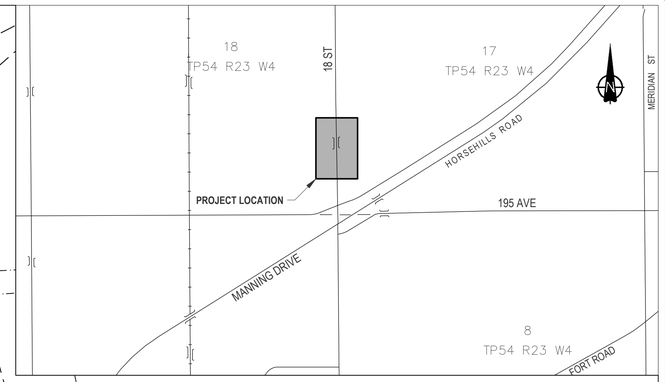
Edmonton
INTEGRATED INFRASTRUCTURE SERVICES
INFRASTRUCTURE DELIVERY

PROJECT
18 STREET OVER HORSEHILLS CREEK
BRIDGE B081
INFORMATION SHEET

DRAWING
S018 251 S02

DETAIL NOTES

1. FINAL LIMITS OF BASE REMOVAL AND GRINDING AT MATCH LOCATIONS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. SAW-CUT AREAS OF BASE REMOVAL.
3. ALL AREAS OF DISTURBANCE ADJACENT TO NEW CONSTRUCTION SHALL BE LANDSCAPED AS REQUIRED.



HORSEHILLS CREEK

SE 18–54–23–4

WETLAND BOUNDARY

WETLAND

EXISTING PROPERTY LINE

SEE STRUCTURAL PLANS FOR BRIDGE AND GUARDRAIL DETAILS

A X01 | B X01 | C X01 | D X01

18 STREET

10+100 | 10+200 | 10+300 | 10+400

LIMIT OF CONSTRUCTION

MATCH EXISTING

PROPOSED DITCH

PROPOSED 18 STREET CL

EXISTING PROPERTY LINE

GRADING LIMIT

WETLAND

HORSEHILLS CREEK

SW 17–54–23–4

WETLAND BOUNDARY

WETLAND BOUNDARY

CAUTION!
OVERHEAD POWER LINES

SURFACE UTILITY LEGEND

- TROLLEY POLES
- WOODEN POWER POLE
- POWER POLE
- STREET LIGHT POLE
- DECORATIVE STREET LIGHT POLE
- POWER MANHOLE
- POLE ANCHOR
- TRAFFIC POLE
- TELEPHONE MANHOLE
- TELEPHONE POLE
- DRAINAGE MANHOLE (SANITARY)
- DRAINAGE MANHOLE (STORM)
- CATCH BASIN MANHOLE
- CATCH BASIN
- FIRE HYDRANT
- WATER VALVE
- WATER TEE
- ANODE
- TELEPHONE POLE
- GAS COUPLING

DETAIL LEGEND

- 40mm 10mm-HT ASPHALT
  100mm 20mm-B ASPHALT
  450mm 3-63 GRANULAR BASE
- REMOVE EXISTING PAVEMENT STRUCTURE
- 300mm TOPSOIL & HYDROSEEDING

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CONTRACT NO.

CONSTRUCTION RETURN

CONTRACTOR

SURVEYOR

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DATE

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DEPARTMENT / BRANCH	APPROVAL	DATE
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YELLOWHEAD TRAIL PORTFOLIO SUPERVISOR, PLANNING AND DESIGN		

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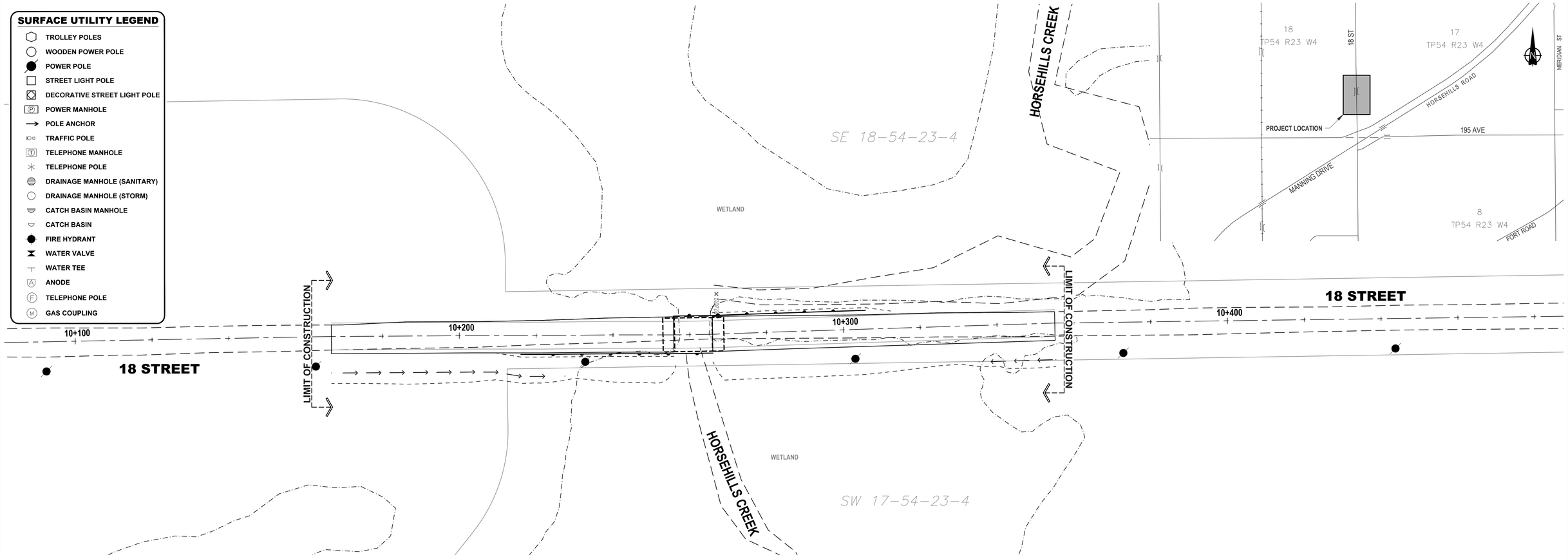
INTEGRATED INFRASTRUCTURE SERVICES
INFRASTRUCTURE DELIVERY BRANCH

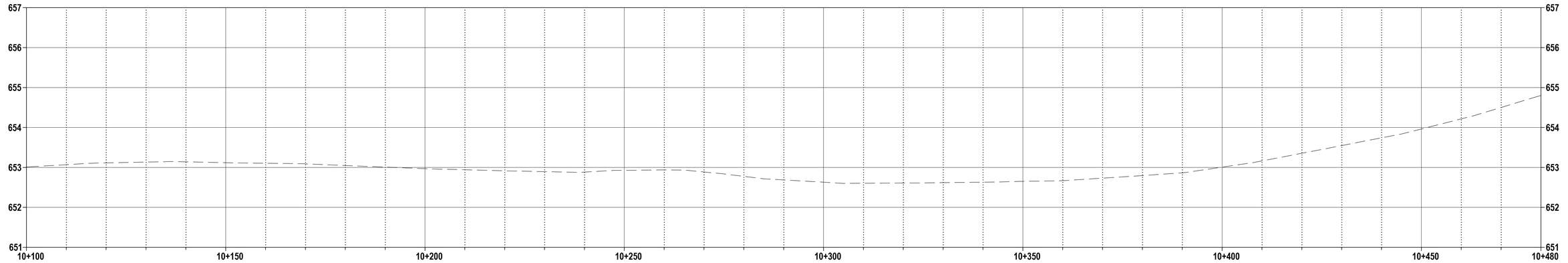
PROJECT
18 STREET OVER HORSEHILLS CREEK
ROADWAY
DETAILS

DRAWING
S018 251 D01

SURFACE UTILITY LEGEND

- TROLLEY POLES
- WOODEN POWER POLE
- POWER POLE
- STREET LIGHT POLE
- DECORATIVE STREET LIGHT POLE
- POWER MANHOLE
- POLE ANCHOR
- TRAFFIC POLE
- TELEPHONE MANHOLE
- TELEPHONE POLE
- DRAINAGE MANHOLE (SANITARY)
- DRAINAGE MANHOLE (STORM)
- CATCH BASIN MANHOLE
- CATCH BASIN
- FIRE HYDRANT
- WATER VALVE
- WATER TEE
- ANODE
- TELEPHONE POLE
- GAS COUPLING





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ROADWAY
GRADES

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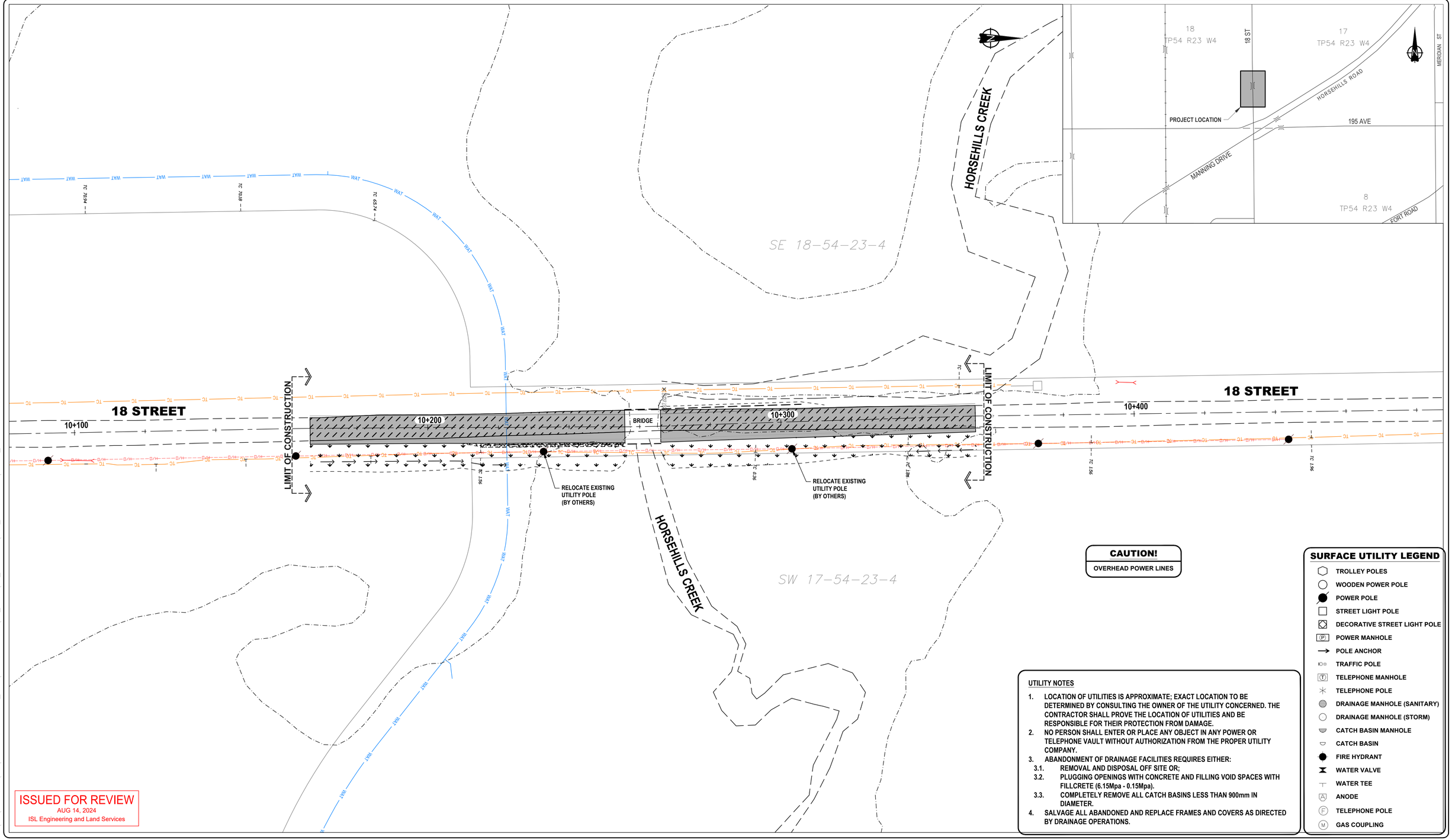
S018 251 G01



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CAUTION!
OVERHEAD POWER LINES

UTILITY NOTES

1. LOCATION OF UTILITIES IS APPROXIMATE; EXACT LOCATION TO BE DETERMINED BY CONSULTING THE OWNER OF THE UTILITY CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND BE RESPONSIBLE FOR THEIR PROTECTION FROM DAMAGE.
2. NO PERSON SHALL ENTER OR PLACE ANY OBJECT IN ANY POWER OR TELEPHONE VAULT WITHOUT AUTHORIZATION FROM THE PROPER UTILITY COMPANY.
3. ABANDONMENT OF DRAINAGE FACILITIES REQUIRES EITHER:
   - 3.1. REMOVAL AND DISPOSAL OFF SITE OR;
   - 3.2. PLUGGING OPENINGS WITH CONCRETE AND FILLING VOID SPACES WITH FILLCRETE (6.15Mpa - 0.15Mpa).
   - 3.3. COMPLETELY REMOVE ALL CATCH BASINS LESS THAN 900mm IN DIAMETER.
4. SALVAGE ALL ABANDONED AND REPLACE FRAMES AND COVERS AS DIRECTED BY DRAINAGE OPERATIONS.

SURFACE UTILITY LEGEND

- TROLLEY POLES
- WOODEN POWER POLE
- POWER POLE
- STREET LIGHT POLE
- DECORATIVE STREET LIGHT POLE
- POWER MANHOLE
- POLE ANCHOR
- TRAFFIC POLE
- TELEPHONE MANHOLE
- TELEPHONE POLE
- DRAINAGE MANHOLE (SANITARY)
- DRAINAGE MANHOLE (STORM)
- CATCH BASIN MANHOLE
- CATCH BASIN
- FIRE HYDRANT
- WATER VALVE
- WATER TEE
- ANODE
- TELEPHONE POLE
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INFRASTRUCTURE DELIVERY BRANCH

PROJECT
18 STREET OVER HORSEHILLS CREEK
ROADWAY
UTILITY

DRAWING
S018 251 U01

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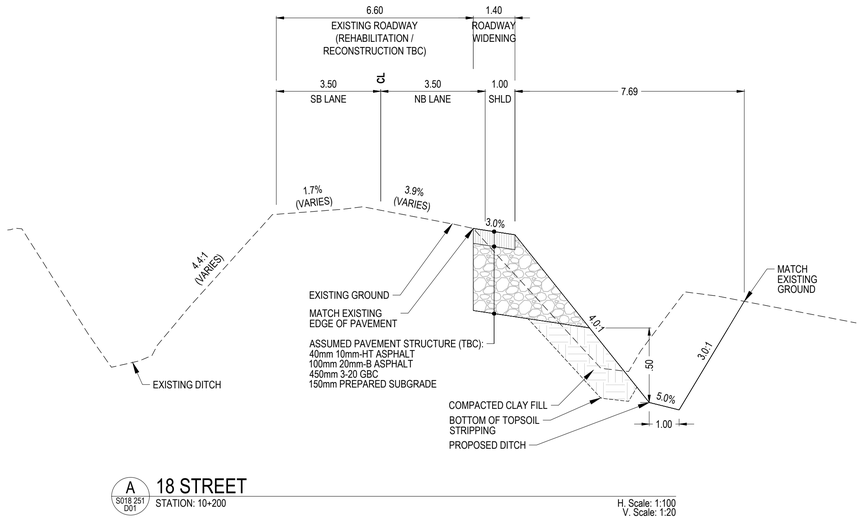
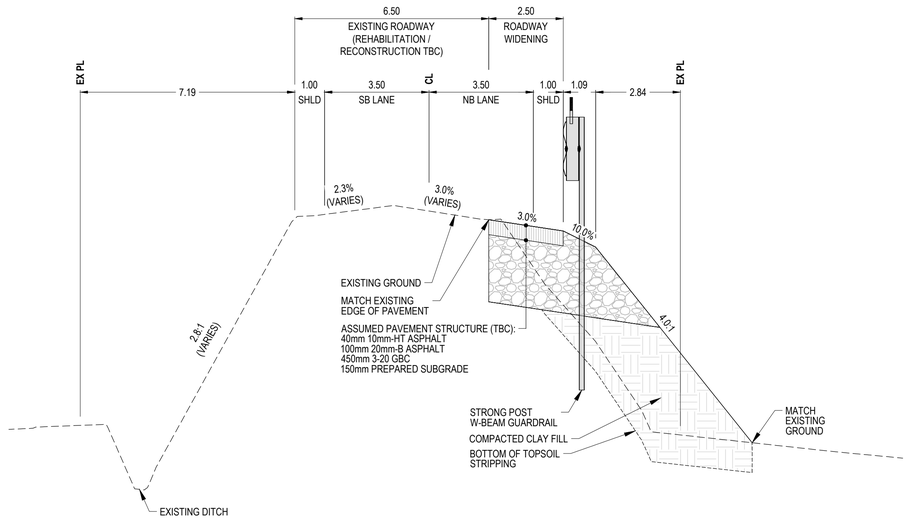


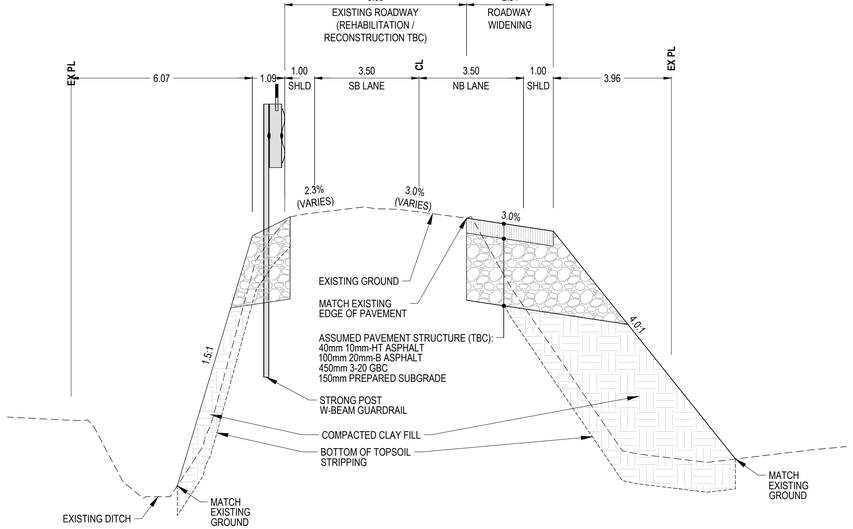
A S018 251 D01 **18 STREET**
STATION: 10+200

H. Scale: 1:100
V. Scale: 1:20



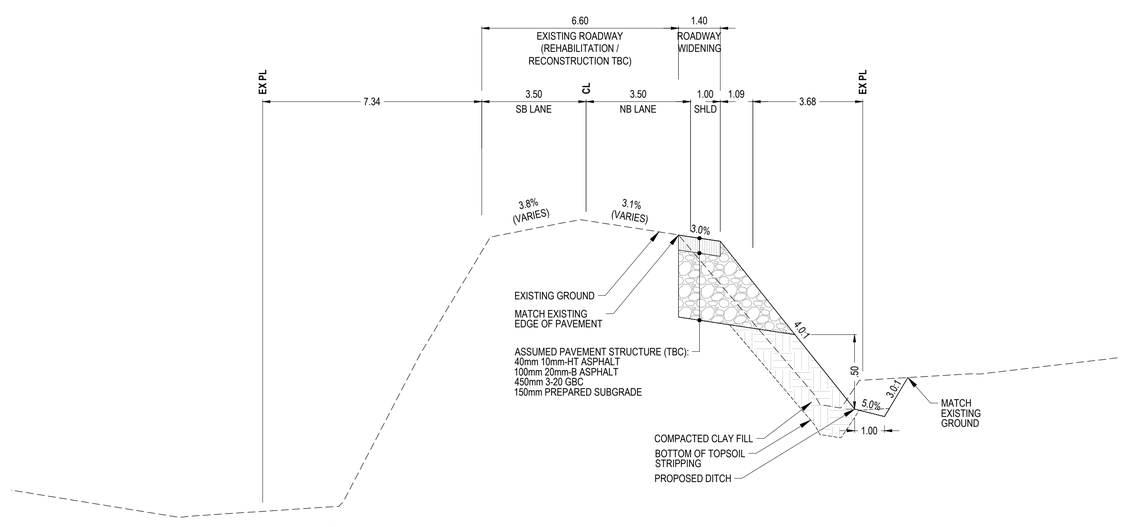
B S018 251 D01 **18 STREET**
STATION: 10+240

H. Scale: 1:100
V. Scale: 1:20



C S018 251 D01 **18 STREET**
STATION: 10+280

H. Scale: 1:100
V. Scale: 1:20



D S018 251 D01 **18 STREET**
STATION: 10+340

H. Scale: 1:100
V. Scale: 1:20

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JOB NO. 16547
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INFRASTRUCTURE DELIVERY BRANCH

PROJECT
18 STREET OVER HORSEHILLS CREEK
ROADWAY
CROSS SECTIONS

DRAWING
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TREE PROTECTION NOTES

ALL TREES AND PLANT MATERIAL ON THE SITE AND ADJACENT PUBLIC LAND ARE SUBJECT TO THE CITY OF EDMONTON TREE PROTECTION GUIDELINES AND BYLAW 18825, STANDARDS AND DETAILS WHICH ARE TO BE APPLIED TO THE COMPLETE SATISFACTION OF THE CITY OF EDMONTON FORESTRY DEPARTMENT. THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL COSTS AND CLAIMS ARISING FROM FAILING TO SATISFY THE CITY OF EDMONTON REQUIREMENTS FOR TREE PROTECTION.

PROTECTION MEASURES TO BE REVIEWED BY THE CITY OF EDMONTON FORESTRY DEPARTMENT AND CONSULTANT PRIOR TO SITE WORK BEGINNING. THE CONTRACTOR SHALL ADJUST OR AMEND PROTECTION MEASURES TO THE SATISFACTION OF THE CITY OF EDMONTON. REFER TO THE CITY OF EDMONTON CORPORATE TREE MANAGEMENT POLICY C456B IN ITS LATEST EDITION.
https://www.edmonton.ca/residential_neighbourhoods/PoliciesDirectives/C456B.pdf

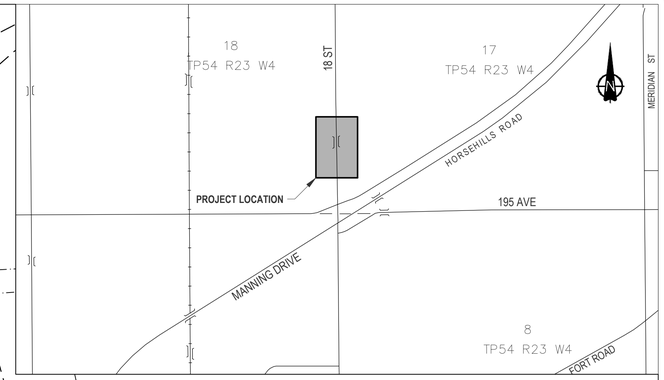
ALL WORK TO COMPLY WITH THE CITY OF EDMONTON TREE PRESERVATION GUIDELINES IN ITS LATEST VERSION.

THE CITY OF EDMONTON FORESTRY DEPARTMENT WILL BE RESPONSIBLE FOR ALL TREE REMOVALS AND RELOCATIONS. THE CONTRACTOR SHALL COORDINATE WITH THE CITY OF EDMONTON FORESTRY DEPARTMENT.

CONTRACTOR SHALL KEEP THE CITY OF EDMONTON FORESTERS UPDATED ON ANY ADDITIONAL WORK THAT IMPACTS THE CITY TREES.

CONTRACTOR TO NOTIFY CITY OF EDMONTON FORESTRY IF ANY ROOTS GREATER THAN 50mm (2 INCHES) IN DIAMETER ARE EXPOSED.

A PUBLIC TREE PERMIT WILL BE REQUIRED FOR ALL WORK WITHIN 5m OF A BOULEVARD OR OPEN SPACE TREE AND 10m FROM A NATURAL STAND, AS PER BYLAW 18825. IF TREE DAMAGE OCCURS, REMEDIATION OR REMOVAL WILL BE ENFORCED AND SHALL BE COVERED BY THE PROPONENT AS PER THE CORPORATE TREE MANAGEMENT POLICY (C456C). THIS INCLUDES COMPENSATION FOR TREE VALUE ON FULL OR PARTIAL TREE LOSS AS WELL AS OPERATIONAL AND ADMINISTRATIVE FEES.



SE 18–54–23–4

HORSEHILLS CREEK

WETLAND BOUNDARY

WETLAND

EXISTING PROPERTY LINE

PROVIDE TREE PROTECTION FENCE

CITY OF EDMONTON FORESTRY TO REMOVE EXISTING TREES

MATCH EXISTING

LIMIT OF CONSTRUCTION

18 STREET

10+100 10+150 10+200 10+250 10+300 10+350 10+400 10+450

PROPOSED 18 STREET CL

PROPOSED DITCH

EXISTING PROPERTY LINE

GRADING LIMIT

PROVIDE TREE PROTECTION FENCE

WETLAND

HORSEHILLS CREEK

WETLAND BOUNDARY

WETLAND BOUNDARY

CAUTION!
OVERHEAD POWER LINES

SE 18–54–23–4

LANDSCAPE LEGEND

300mm TOPSOIL AND SEED - NON-MAINTAINED NATURALIZATION LANDSCAPING - DRY MEADOW SEED MIX
20% June Grass
20% Rough Fescue
10% Green Needlegrass
15% Streambank Wheatgrass
20% Northern Wheatgrass
10% Sheeps Fescue
5% Annual Ryegrass

NON-MAINTAINED NATURALIZATION LANDSCAPING - WET MEADOW SEED MIX
10% Awned Wheatgrass
10% Western Wheatgrass
10% Sloughgrass
20% Tufted Hair Grass
15% Giant Wild Rye
30% Fowl Bluegrass
5% Annual Ryegrass

TREE PROTECTION FENCE

SURFACE UTILITY LEGEND

- TROLLEY POLES
- WOODEN POWER POLE
- POWER POLE
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- DECORATIVE STREET LIGHT POLE
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INFRASTRUCTURE DELIVERY BRANCH

PROJECT
18 STREET OVER HORSEHILLS CREEK
ROADWAY
LANDSCAPE

DRAWING
S018 251 H01

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Appendix J

City Review Supplement

Comment/Response Log

Response to Comments Received September 5, 2024.

Review Comment	Response	EIA Report Section Reference
City Planning (Growth Planning, Urban Growth and Open Space Strategy)		
Please provide detailed landscaping and restoration plan design information in accordance with the Design and Construction Standards Volume 5 Landscaping (2022).	Landscape plans are currently underway. City approved seed mixes will be prescribed as follows: Dry Meadow Seed Mix for areas outside of the riparian zone. Wet Meadow Seed Mix for riparian areas.	Landscape Drawings provided in Appendix I of EIA.
Please provide a detailed bridge design if available, or at minimum a preliminary bridge design. Ensure mitigation measures from table 5.2 Standard and Site-Specific Mitigation for Potential Effects of the Proposed Project are included, and expand table 5.2 to include the corresponding drawings and how it will be implemented (e.g. CCC/FAC and other monitoring requirements). • Further Clarification: table 5.2 should reference the applicable drawing, and if appropriate drawing detail that shows where and how the mitigation measure is to be implemented (for mitigation measures that can be shown in drawings anyhow, not applicable to mitigation measures such as suspend work during inclement weather).	Available bridge design drawings are at 60% design stage. Drawings will be included as an appendix to EIA. Site specific environmental and ESC controls are to be designed and implemented by future selected Contractor and included in future Contractor's ECO Plan.	60% Design Drawings provided as Appendix I of EIA.
Please provide a full concordance table that captures all EIA outlined requirements. This will help transition EIA outcomes through the detailed design, construction, and post construction stages. • Further Clarification: provide a comment response table to the comments that were provided (comment/response log as you mentioned). Additionally, within the EIA as an appendix please include a concordance table similar to that shown below. This table can be provided to applicable individuals to help ensure that EIA mitigation measures are carried out through the detailed design, construction, and post construction stages, without the need to revert back to the full detailed EIA.	Comment Response Log and Concordance Table created as requested.	Comment Response Log and Concordance Table included in Appendix J of EIA
For clarity, in section 2.4 please correct repeated section heading numbers (ie multiple 2.4.1, 2.4.2, 2.4.3, and 2.4.4 headings), as well as repeated text on end of pdf page 15 and start of pdf page 16.	Corrections made	Sections throughout (editorial)
In Table 4.8 Information and Evidence Used to Classify Wetlands, please provide the ABWRET-A value once results have been received (based on report date results should by now have been provided).	Results of ABWRET-A: C added	Table 4.8, page 36
Table 4.11 Wetland Areas of Impact should be updated as the areas provided for wetland area, impact area, and remaining area are incongruent.	Updated as suggested	Table 4.11 page 38

Review Comment	Response	EIA Report Section Reference
In Table 5.2 Standard and Site-Specific Mitigation for Potential Effects of the Proposed Project ensure that there is alignment between mitigation measures for each environmental component. For instance fish and fish habitat says “Prohibit fuel storage, refueling, or servicing of equipment within 30 m of any waterbodies (i.e., Horsehills Creek), except where secondary containment and/or tertiary containment is provided” while wetlands says “Prohibit fuel storage, re-fueling, or servicing of equipment within 100 m of any waterbody.”	Updated as suggested	Table 5.2 Mitigation Table
Please include a section detailing what public consultation was completed, and if public consultation was not completed explain why.	Section added to address Public Consultation as suggested	Section 2.4.9, page 9
Community and Recreation Facilities (River Valley Parks and Facilities)		
No comments	n/a	n/a
Parks and Roads Services (Natural Area Operations)		
No comments	n/a	n/a
Parks and Roads Services (Resource Planning and Land Development):		
No comments	n/a	n/a
EPCOR Drainage Services (Water and Sewer Servicing)		
No Comments	n/a	n/a
EPCOR Drainage Services (Drainage Planning and Engineering)		
No Comments	n/a	n/a
Business Planning and Support (Engineering Services)		
No Comments	n/a	n/a

Concordance Table

Ecosystem Component	Potential Environmental Impact	Mitigation Measures for Planning and Design Phase	Mitigation Measure Recommendations for Contractor's ECO Plan
Geotechnical and Soils	Alteration of banks as a result of earthworks to achieve engineering requirements	Hydrotechnical report recommended armoring the bank. Riprap is specified in the bridge design to protect the creek banks.	Include a sketch that indicates required disturbance footprint minimizing disturbance in particular around Horsehills Creek.
	Admixing of soils		Separate stockpiling of soil horizons.
	Interaction with contaminated soils	Specify that soil from top 1 m should be considered contaminated and disposed of at a Class 2 landfill.	Address the contaminated soil removal and include monitoring for compliance. Include a Contaminated Soil Chance Find Procedure.
Hydrology and Surface Drainage	Alteration of surface hydrology of Horsehills Creek and drainage patterns throughout the Project Area	Bridge design is longer span than existing so surface hydrology of Horsehills Creek will be maintained. Drainage patterns throughout the Project Area will be maintained due to minimizing disturbance footprint in design.	Limit disturbance footprint to area designated in design drawings. ECO Plan and ESC Plan shall address site drainage during construction phase.
	Erosion and sedimentation into Horsehills Creek during construction		ECO Plan and ESC Plan shall address erosion and sedimentation during construction including compliance monitoring and maintenance. ESC controls and revegetation shall be implemented as soon as feasible.

Ecosystem Component	Potential Environmental Impact	Mitigation Measures for Planning and Design Phase	Mitigation Measure Recommendations for Contractor's ECO Plan
Fish and Fish Habitat	Direct mortality of fish	Isolation of work area will be required in Contract documents.	Contractor will provide details regarding in-creek isolation methods in their Care of Water plan. Fish salvage techniques, compliance and monitoring shall be detailed in Contractor's ECO Plan.
	Alteration of riparian habitat Alteration of instream habitat	Extent of instream work has been minimized through design. Sportfish are not present in Horsehills Creek.	Minimize vegetation removal particularly in riparian areas. Stake out disturbance footprint, prohibit disturbance beyond designated work areas.
	Sedimentation of Horsehills Creek during construction		Direct the grading away from Horsehills Creek to the extent possible, to reduce the risk of sedimentation. Vegetative buffers should be maintained where feasible. Where practical, delay grading until immediately before construction of the crossing. If pumping occurs, pump sediment laden dewatering discharge into an approved upland vegetated area or settling basin to prevent sediment and other deleterious substances from directly re-entering Creek.
Wildlife and Wildlife Habitat	Disturbance to nesting, breeding or overwintering groups or individuals	A Barn Swallow nest (May Be at Risk) was found on the bridge but did not appear active. A raptor species was observed during survey. Work is recommended to be restricted to outside the nesting period of March 15 to August 31 or a sweep conducted.	If clearing is required within known breeding periods, an inclusive preconstruction wildlife survey should be completed by a qualified specialist. If breeding activity is observed, appropriate disturbance buffers should be implemented.
	Disturbance to wildlife habitat		Avoid disturbance of natural habitats by minimizing work footprint to established rights-of-way, trails, pads, etc. Work only within designated areas within the Project work area

Ecosystem Component	Potential Environmental Impact	Mitigation Measures for Planning and Design Phase	Mitigation Measure Recommendations for Contractor's ECO Plan
Wetlands	Loss of wetland area Compaction of soils and wetland vegetation species	Design minimized disturbance to wetlands such that of the entire wetland area (14.45 ha), only 0.7% (0.10 ha) is impacted by the Project.	Ensure construction avoids work within wetland areas excluded from the regulatory approvals. Have records of regulatory approvals available on site in the site trailer or foreman's truck. Stake boundaries of the construction footprint, temporary workspace, stockpiles and any access. Do not allow disturbance beyond the stakes unless additional workspace rights have been obtained.
	Sedimentation of the wetland during construction		Install effective ESC measures as per ESC Plan prior to starting work. Monitor and maintain as necessary. Sedimentation of the wetland would be a violation of the *Water Act*.
Vegetation	Loss of native plant species and communities including rare plants and potential rare plant habitat		Delineate boundaries to avoid disturbance of any additional natural habitat beyond the Project workspace, around Horsehills Creek and its wetland fringe area. Do not allow clearing or grading beyond the delineation unless mitigation plans and approvals for that area have been made/obtained. Re-delineate the boundaries where warranted following disturbance.
	Introduction of new weed or invasive species and/or further establishment of existing weed or invasive species		Weed control prior, during, and following construction, as well as equipment cleaning and soil handling procedures to minimize weed spread should be included in Contractor's ECO Plan. If weed species on the Weed Act are observed, they are to be immediately controlled or eradicated as per the Weed Act. Revegetate with approved City seed mixes as per the Landscape Plan as soon as possible.

Ecosystem Component	Potential Environmental Impact	Mitigation Measures for Planning and Design Phase	Mitigation Measure Recommendations for Contractor's ECO Plan
Historic Resources	Impacts to Historical Resources		The Contractor shall develop a Chance Find Procedure for Historical Resources. Any discovery of additional archaeological resources, palaeontological resources, Aboriginal traditional use sites and/or historic sites are required to be reported to the Engineer and to the Ministry of Arts, Culture and Status of Women.
Recreational Resources	Closures and Detours		Provide signage notifying the public of closures and providing detour options.
Visual Resources	Loss of aesthetic values by visitors/recreational users		Revegetate with approved City seed mixes as soon as possible to minimize disturbance to aesthetic value.