Mill Creek Trestle Bridge (B034) and Culvert under 76 Avenue (B038) Replacement

City of Edmonton | 16307
Environmental Impact Assessment

March 2025

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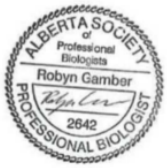

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Executive Summary

The Mill Creek Trestle Bridge and 76 Avenue Culvert Replacement Project is a major infrastructure initiative aimed at preserving historical and functional connectivity while improving environmental conditions in the Mill Creek Ravine.

The project includes the restoration or replacement of the existing timber trestle bridge (B034) and the replacement of the 76 Avenue concrete culvert (B038) with a bridge structure to enhance hydraulic capacity and daylight the creek. Additionally, bank stabilization measures will address ongoing erosion issues downstream of the trestle bridge.

This Environmental Impact Assessment was conducted to evaluate potential environmental effects and mitigation measures. The study assessed various components, including surface water, hydrotechnical stability, geotechnical conditions, vegetation, wildlife, fish habitat, historical resources, and recreational impacts. The findings indicate that the existing culvert constrains flow and contributes to scour and erosion downstream. To mitigate these issues, the project will incorporate creek realignment, improved flow conveyance, and erosion protection measures.

Key environmental considerations include minimizing disturbance to vegetation and wildlife, particularly migratory birds, amphibians, and fish species present in Mill Creek. A tree protection plan, wildlife sweeps, erosion control measures, and sediment management strategies will be implemented to mitigate potential impacts. A concordance table is provided below that reflects the mitigation undertaken through design, and what will be required by the Contractor during construction. The project will also enhance ecological connectivity by improving fish passage and restoring natural stream dynamics.

Public consultation was undertaken with stakeholders, including community leagues and environmental organizations, to address concerns about tree removal, recreational trail access, and historical preservation.

The project design balances heritage conservation with modern structural and environmental requirements, ensuring the new bridge maintains the historical character while providing long-term durability and safety.

Overall, the project is expected to deliver significant environmental and community benefits by improving infrastructure longevity, enhancing hydrological function, reducing erosion risks, and maintaining safe, accessible recreational pathways. The implementation of best management practices and ongoing environmental monitoring will ensure compliance with regulatory requirements and minimize residual environmental effects.

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	The engineering design and landscape plans (created during the design phase) for the downstream side of the trestle bridge will limit future erosion.	Limit impacts to landscape by limiting construction footprint of project to extent feasible. The contractor shall fence or mark off the construction limits. The fence stall be tacked to the ground.
	Slope failure during construction	Conduct work from trail at top of bank where possible	Implement all mitigation measures related to erosion and sediment control. Follow mitigation recommendations in the Geotechnical report for slope stabilization work.
	Admixing of soils	-	Separate stockpiling of soil horizons where and if required.
	Interaction with contaminated soils	-	Include a Contaminated Soil Chance Find Procedure in the ECO Plan.
Hydrology and Surface Drainage	Alteration of surface hydrology of Mill Creek	Armour bed and banks of Mill Creek near bridge footings with riprap, remove failing gabion baskets and repair scour hole and bank erosion to reverse hydrotechnical impacts. 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. The contractor shall fence or mark off the construction limits. The fence stall be tacked to the ground. ECO Plan and ESC Plan shall address site drainage during construction phase. Do not remove root systems of vegetation wherever feasible, to limit erosion and dust.
	Alteration of Drainage Patterns	Maintain drainage patterns through the site through design and attempt to design to retain entire seasonal and semi-permanent stream lengths	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.

Ecosystem Component	Potential Environmental Impact	Mitigation Measures for Planning and Design Phase	Mitigation Measure Recommendations for Contractor's ECO Plan
	Erosion and sedimentation into Mill 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. See Fish and Fish Habitat, below.
Fish and Fish Habitat	Direct mortality of fish	Isolation of work area will be required in Contract documents. Work within the watercourse should be conducted in low-water season as much as possible Develop and implement a response plan to avoid a spill of deleterious substances into water.	Contractor will provide details regarding in-creek isolation methods in their Care of Water plan. Fish scare and rescue techniques, compliance and monitoring shall be detailed in Contractor's ECO Plan.
	Alteration of riparian habitat Alteration of instream habitat	Include fish habitat features within the new channel alignment, including riffles and pools. Ensure a 'low-flow' channel is incorporated into the design to allow for fish habitat to be present during drought conditions.	Limit impacts to instream fish habitat by limiting instream footprint to the extent required. Do not conduct work outside the limit permitted in the regulatory approval.

Ecosystem Component	Potential Environmental Impact	Mitigation Measures for Planning and Design Phase	Mitigation Measure Recommendations for Contractor's ECO Plan
	Sedimentation of Mill Creek during construction	-	Direct the grading away from Mill Creek to the extent possible, to reduce the risk of sedimentation. ECO Plan and ESC Plan shall address erosion and sedimentation during construction including compliance monitoring and maintenance. Inspect temporary sediment control structures 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. Complete turbidity monitoring during instream work to ensure downstream areas are not impacted by Construction
Wildlife and Wildlife Habitat	Direct mortality to wildlife during construction	-	During the nesting period, a nest sweep should be completed 7 days or fewer prior to the outset of construction to prevent accidental take. Further, activities occurring within the nesting period must not be stopped on site any longer than 4 days or another sweep must be conducted.
	Disturbance to nesting, breeding or overwintering groups or individuals	-	Outside the nesting period, a wildlife and nest sweep should be completed by a qualified wildlife specialist as a due diligence measure to avoid destruction of an active nest (utilized within the previous 3 years) or den, hibernacula or wildlife.

Ecosystem Component	Potential Environmental Impact	Mitigation Measures for Planning and Design Phase	Mitigation Measure Recommendations for Contractor's ECO Plan
	Disturbance to wildlife habitat (nests, dens, hibernacula)	Work only within designated areas within the Project work area Design for wildlife passage under the bridge to facilitate access to additional habitat in the Mill Creek Ravine	In the event that migratory birds or their nests are identified during the nest sweep, or species of regulatory concern or dens or hibernacula are encountered, a setback may be identified through consultation with ECCC where feasible.
Vegetation	Loss of native plant species and communities	Narrow construction limits to the minimum required for construction. Do not plan for placement of temporary workspace where significant tree removal is required to accommodate it. Design and implementation of a Tree Protection Plan for the Project: Tree removal will be limited to the extent feasible in the temporary workspaces around Mill Creek Trestle bridge. A separate Tree Protection Plan is being developed by ISL in consultation with the City to provide a clearer understanding of the tree removals required.	Limit impacts to landscape by limiting construction footprint of project to extent feasible. The contractor shall fence or mark off the construction limits. The fence stall be tacked to the ground.
	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.
Historic Resources	Impacts to Historical Resources	Mitigation measures may be altered if low invasive methods (e.g. screw piling) are used, but is at the discretion of the paleontologist.	The Contractor shall develop a Chance Find Procedure for Historical Resources and will include the procedure in the ECO Plan. Paleontology monitoring is required to occur during excavations. The contractor shall notify the paleontologist when work begins. No excavation work shall occur without the paleontologist on site.

Ecosystem Component	Potential Environmental Impact	Mitigation Measures for Planning and Design Phase	Mitigation Measure Recommendations for Contractor's ECO Plan
Recreational Resources	Closures and Detours	Preferentially conduct bridge construction at known low recreational use times of the year.	The contractor shall provide signage notifying the public of closures and providing detour options.
Visual Resources	Loss of aesthetic values by visitors/recreational users	Design and implement a Tree Protection Plan Enhance aesthetic value of the eroded creek bank by incorporating engineered vegetated slope.	Revegetate with approved City seed mixes as soon as possible to minimize disturbance to aesthetic value. 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, as per the landscape plan.

1.0
The Property

1.1 Introduction

The City of Edmonton (the City) is proposing to restore the historic timber trestle bridge (B034) in Edmonton, Alberta (the Project). The Project location and overall understanding is depicted in Figure 1.1. Excessive timber rot has reduced the capacity of the structure, such that it no longer meets its functional requirements and restoration or replacement via replication is required.

In addition to the timber trestle bridge, this Project includes the concrete culvert that carries 76 Avenue over Mill Creek (B038) adjacent to the pedestrian crossing. The concrete culvert will be replaced with a bridge structure to improve the hydraulic capacity of the crossing and daylight the creek. A creek realignment is required to accommodate the new crossing. Additionally, significant bank erosion has occurred downstream of the trestle bridge that requires stabilization to ensure that further erosion does not occur.

1.2 Environmental Impact Assessment Objectives

An Environmental Impact Assessment (EIA) Terms of Reference (TOR) was provided to ISL by the City's Urban Growth and Open Space (UGOS) in the Urban Planning and Economy Department in September 2022 and an updated copy provided in June 2024 (City of Edmonton 2024). A copy of the most recent 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.

The TOR has been followed to the extent possible. The only variance from the TOR is not providing a single Environmental Sensitivities Map, as this was felt to be overly busy for a single figure. Each VEC has provided a sensitivity map, where appropriate.

1.3 Report Organization

This EIA is organized as per the agreed-upon TOR. It includes an introduction, existing conditions for each VEC, project description, potential impacts and mitigation measures, recommendations for environmental monitoring during construction, public consultation results, an impacts summary and closing. Information supplemental to sections is provided in appendices.

Figure 1.1: Project Overview

1.4 Background

1.4.1 Historical Background

The Mill Creek Trestle Bridge is a valuable resource to the City of Edmonton, both historically and functionally. In 2004, the City designated the bridge as a Municipal Historic Resource, recognizing that its preservation is in the public interest. The bridge consists of a timber trestle originally built between 1900 and 1902 to support rail traffic as part of the Edmonton, Yukon and Pacific Railway (EY&P). The EY&P also included the Low Level Bridge and was the first rail connection between Edmonton and Old Strathcona. The Mill Creek Trestle Bridge is now one of the last remaining components of this historically significant railway.

The bridge was converted from rail to pedestrian use and now forms part of an extensive trail network. In general, the trails in this area of Mill Creek Ravine are situated at two distinct levels: an upper paved multi-use path that includes the trestle bridge and a lower gravel trail. The upper paved pathway conveys commuters quickly through the area, whereas the lower trail is a more casual trail used by hikers, dog walkers, and other recreational users. The Mill Creek Trestle Bridge (B034) is a landmark for the lower trail as well, which meanders near creek level in the ravine and provides picturesque views of the historic trestle. As a visible landmark structure and a key connection for pedestrians and cyclists, the trestle bridge has a high social value.

1.4.2 Property Information

Project Location

As detailed in Section 1.1 and shown on Figure 1.1, the Project is located southeast of the downtown core in the City of Edmonton. The Project includes the trestle bridge carrying the pedestrian multiuse trail over Mill Creek adjacent to 76 Avenue, as well as replacement of the concrete culvert with a bridge carrying 76 Avenue over Mill Creek.

Historical Land Use

Historical air and satellite photographs, from 1952 to current, are provided in Appendix G. As shown, land use in the Project Area has been consistent throughout this timeframe as parkland, bridge, and right of way with area residential development starting prior to 1952 and largely completed by 1969. No images taken prior to 1952 were available but based on historical records we understand that the Trestle Bridge was completed in 1902 as a railway bridge. The area immediately surrounding the bridge was otherwise undeveloped at that time.

Current Land Use, Ownership and Zoning

As shown in Figure 1.2 below, the Project Area is currently zoned as River Valley Zone (CoE 2024 [Edmonton Zing bylaw 20001; Effective January 1, 2024]). The land in the Project Area is owned by the City of Edmonton and is currently being used as roadway, right of way, multiuse pedestrian trail and parkland.

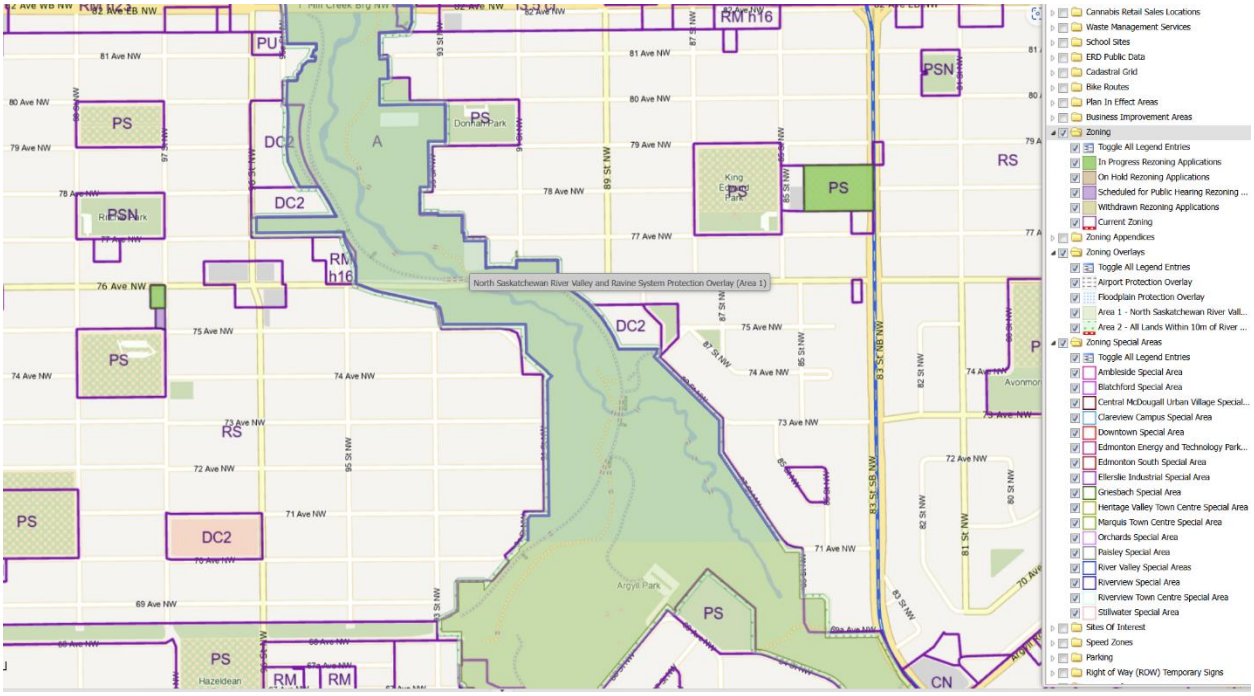


Figure 1.2 Land Ownership and Zoning

1.5 Regulatory Framework

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.

1.5.1 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 Mill Creek Trestle Bridge replacement and culvert replacement requires realignment of Mill Creek, a Request-for-Review will be submitted for the Project. 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

The *Migratory Birds Convention Act (MBCA)* is administered by Environment and Climate Change Canada (ECCC) to ensure protection of migratory birds, their nests, and their eggs. Birds protected by the *MBCA* include waterfowl (such as ducks, geese, and swans), insectivorous birds (such as wrens, robins, shrikes, and woodpeckers), and some nongame birds (such as herons and gulls) (GoC 1994, ECCC 2014).

To protect migratory birds, ECCC provides general nesting periods based on geographic location (ECCC 2018). The general nesting period covers the majority of species covered under the *MBCA*; however, it may not be accurate for species that can breed at any time during optimal conditions (*e.g.* crossbill species), or species that may nest earlier or later (ECCC 2018). Nests of pileated woodpeckers may also protected year-round as the nests are frequently used year over year or by other species. If a nest has not been actively used for 3 consecutive years, it is no longer considered active. No pileated woodpecker nests were observed during the field assessment.

The general migratory bird-nesting period for the Project is mid-April to late August (ECCC 2018). The Local Study Area (LSA) has good potential raptor and owl habitat, therefore it is recommended that this Project observe a general **nesting period of February 1 to August 31**, for species that may nest outside this period, e.g., Great-horned Owl [*Bubo virginiaus*]).

Outside the nesting period, a nest sweep should be completed by a qualified wildlife specialist as a due diligence measure to avoid destruction of an active nest (utilized within the previous 3 years). During the nesting period, an additional nest sweep should be completed 7 days or fewer prior to the start of construction to prevent incidental take. Further, activities occurring within the nesting period must not be stopped on site any longer than 4 days or another sweep must be conducted. In the event that migratory birds or their nests are identified during the nest sweep, a setback may be identified through consultation with ECCC where feasible.

Additionally, If any species listed under schedule 1 of the SARA are observed during wildlife sweeps or nesting bird surveys that may be impacted, then extra mitigations will be determined by a qualified wildlife specialist and coordination with ECCC may be initiated

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.

Mill 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 (Government of Canada 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; and,
- 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.

1.5.2 Provincial

Water Act

The *Water Act* contains the requirements for managing Alberta's water resources. Through AEPA, the *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) (AESRD 2012):

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

An application under the *Water Act* will be required for the realignment of Mill Creek and creek bank stabilization (Government of Alberta 2019), while a Water Act Code of Practice will be submitted for the replacement of the culvert and trestle bridge. Mill Creek is a Mapped Class D waterbody under the Code, with no Restricted Activity Period (Alberta Environment and Sustainable Resource Development 2012).

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 *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 Mill Creek in the Project Area. Therefore, a License of Occupation under the Public Lands Act will be required for the Project in areas outside of the existing road plan. A Department License of Occupation (DLO) application will be submitted to Alberta Environment and Protected Areas (AEPA) as part of the detailed design phase of the project.

Wildlife Act

In addition to the federal *MBCA*, birds may be protected provincially under the *Wildlife Act* (Government of Alberta 2000). AEPA 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 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.

No formal submission under the Wildlife Act is required. Medium-high quality raptor habitat is present in the Project area, therefore a general nesting period of February 1 to August 31 is recommended with consideration for species that may nest outside this period (e.g., Great-horned Owl). Nest sweeps should be completed prior to construction as discussed under MCBA. Setback distances, if required and feasible, will be determined following nest sweeps and consultation with ECCC.

Historical Resources

The *Historical Resource Act* is administered by Alberta Culture (AC) to preserve and study Alberta's historical resources (Government of Alberta 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 *Act*. *Historical Resource Act* clearance must be obtained by AC before development. To determine if the Project will be subject either to further studies or construction requirements, a Historical Resources application is submitted. The results of the application will determine if further studies, such as a Historical Resources Impact Assessment (HRIA) are required to mitigate the Project impacts and if so, AC will provide *Historical Resource Act* clearance through the successful completion of an HRIA (GOA 2000a). If no further studies are required, *Historical Resources Act* approval will be granted, subject to Section 31 of the *Act*.

Turtle Island Historical Services has submitted an Historical Resources Impact Assessment for the Project to Alberta Culture and has been required to complete a HRIA for the project. The HRIA has been completed and has been submitted the Alberta Culture in January2025. Any mitigation required by the future approval will be incorporated into the Contractor's ECO Plan.

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):

- 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* including six noxious weeds and one prohibited weed were identified during the vegetation studies assessment. Measures to satisfy the *Weed Control Act* will be identified and implemented by the Contractor in their ECO Plan.

1.5.3 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 2019a).

Corporate Tree Management Policy C456C

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 Guidelines for Evaluation of Trees (City of Edmonton 2019b). 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 metres of a Natural Stand (City of Edmonton 2020b). A Tree Protection Plan is being prepared for the Project by ISL, separately from this report.

Public Tree Bylaw 18825 (City of Edmonton 2021a)

Initiating any work without obtaining a valid Public Tree Permit is considered an offense under the Public Tree Bylaw 18825. Once the Public Tree Permit is issued, the tree protection and preservation measures in the plan can be installed. The Public Tree Permit holder will be responsible for ensuring that the Tree Preservation Plan is fully implemented and the conditions of the permit are being met at all times by anyone working on the site.

A Tree Preservation Plan is being prepared for the Project by ISL, separately from this report.

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 2007a) 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 B, City of Edmonton 2020c), 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 water including potentially contaminated runoff into watercourses is regulated locally by the City of Edmonton Drainage Bylaw (City of Edmonton 2021b). 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 13472 Designation of Mill Creek Trestle Bridge as a Municipal Historic Resource

The Mill Creek Trestle Bridge was designated as a Municipal Historic Resource under Bylaw 13472 (City of Edmonton 2004). Further, it was determined that any future repair works or replacement should maintain the historical aesthetic value.

The historical value has been considered a significant priority through the design process, and has been extensively discussed in the Preliminary Design Report (ISL 2023).

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 (City of Edmonton 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 and requires an EIA.

In September 2022, 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. Urban Form also advised that a Site Location Study would not initially be required. However, since the Project has evolved to a greater extent, a SLS has been completed and submitted under a separate cover.

This EIA is prepared for the purpose of addressing the requirements of Bylaw 7188.

City of Edmonton Parkland Bylaw C2202

The Parkland Bylaw C2202 regulates the conduct and activities of people on Parkland in order to promote the safe, enjoyable and reasonable use of such property and to protect and preserve natural ecosystems for the benefit of all citizens of the City (City of Edmonton 2022a). A Parkland Access Permit is required for activities that impact City Parklands, including temporary workspaces, construction laydown areas, exploratory work including surveys and geotechnical investigations, or access through parkland for workers, materials, or equipment and must be approved under the River Valley Bylaw 7188.

ISL has confirmed with the City that a Parkland Access Permit will not be required for this Project, as the entirety of the Project will occur under the Project footprint.

City of Edmonton Contractors Environmental Responsibilities Package (CERP)

The City of Edmonton's CERP outlines the environmental obligations for contractors engaged in construction (CoE 2022b), operation, maintenance, service activities, hired equipment, and consultancy services on behalf of the City. The CERP is tied to the City's Environmental Policy (C512), which focuses on continual environmental improvement, pollution prevention, and regulatory compliance.

Contractors for the City of Edmonton must understand and comply with all relevant environmental laws, regulations, permits, and approvals. They are also responsible for ensuring that all personnel, including employees and subcontractors, are aware of and follow these legal requirements.

1.5.4 Environmental Permit Approval Checklist

An IIS-F-1018 Environmental Permit Checklist has been completed and attached as Appendix B to provide clarification and a summary of the relevant regulatory approval requirements, up to date for the time of the submission of the EIA. The checklist is a living document and will be updated through the design, tender and construction periods of the Project.

2.0 Environmental Context

2.1 Study Methodology

2.1.1 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 2.1). The Study Areas for the fieldwork are defined by each VEC; the aquatics study focused on Mill Creek from 100m upstream of the bridge to 300m downstream of the bridge; the wildlife Study Area 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) used for this EIA is based on the ravine area potentially directly impacted by construction, and indirect construction effects including: access and laydown, stockpile or other temporary use areas (see Figure 2.2). The LSA also includes connected similar natural habitat types outside of the direct and indirect construction area and includes potential areas of recreational and visual impacts.

2.1.2 Literature and Database Review

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

- ISL's B034 and B038 Preliminary Design Reports (ISL 2023, ISL 2024)
- Thurber Engineering Ltd. (Thurber)'s Preliminary Risk Management Plan (Thurber 2017)
- Golder Associates (Golder)'s Phase 1 ESA Argyll Park (Golder 2015)
- Golder's Hydrotechnical Services for Trestle Bridge and Culvert, Mill Creek at 76 Avenue (Golder 2023).
- City of Edmonton Bylaw 13472 Designation of Mill Creek Trestle Bridge as a Municipal Historic Resource (City of Edmonton 2004)
- Thurber's Desktop Geotechnical Assessment (Thurber 2021)
- Morrison Hershfield B034 Bridge Load Evaluation (Morrison Hershfield 2021)
- Morrison Hershfield B034 Bridge Condition Assessment and Conceptual Rehabilitation Options (Morrison Hershfield 2021a)
- Turtle Island Cultural Resource Management's Historical Resources Act Clearance Application (Turtle Island 2022)
- Natural Regions Committee (NRC 2006)
- City of Edmonton Biodiversity Report (Hobson, et. Al, 2008)
- 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 Conservation Information Management System (ACIMS)
- Alberta Fish and Wildlife Management Information System (FWMIS)

2.1.3 Field Methodology

For each VEC assessment that included field survey; the methodology is described within the relevant section. Desktop reviews were conducted prior to field surveys to inform the specialist of the general ecosystem conditions. Field surveys were conducted in fall 2022. Due to Project timing and phasing, additional surveys or investigations (i.e. rare plant survey and Historical Resources Impact Assessment) have occurred in 2023 and 2024 to provide additional information on the Project area. Additional surveys may be issued as addenda to this EIA if deemed required by the EIA reviewer. Field photographs are included in Appendix H.

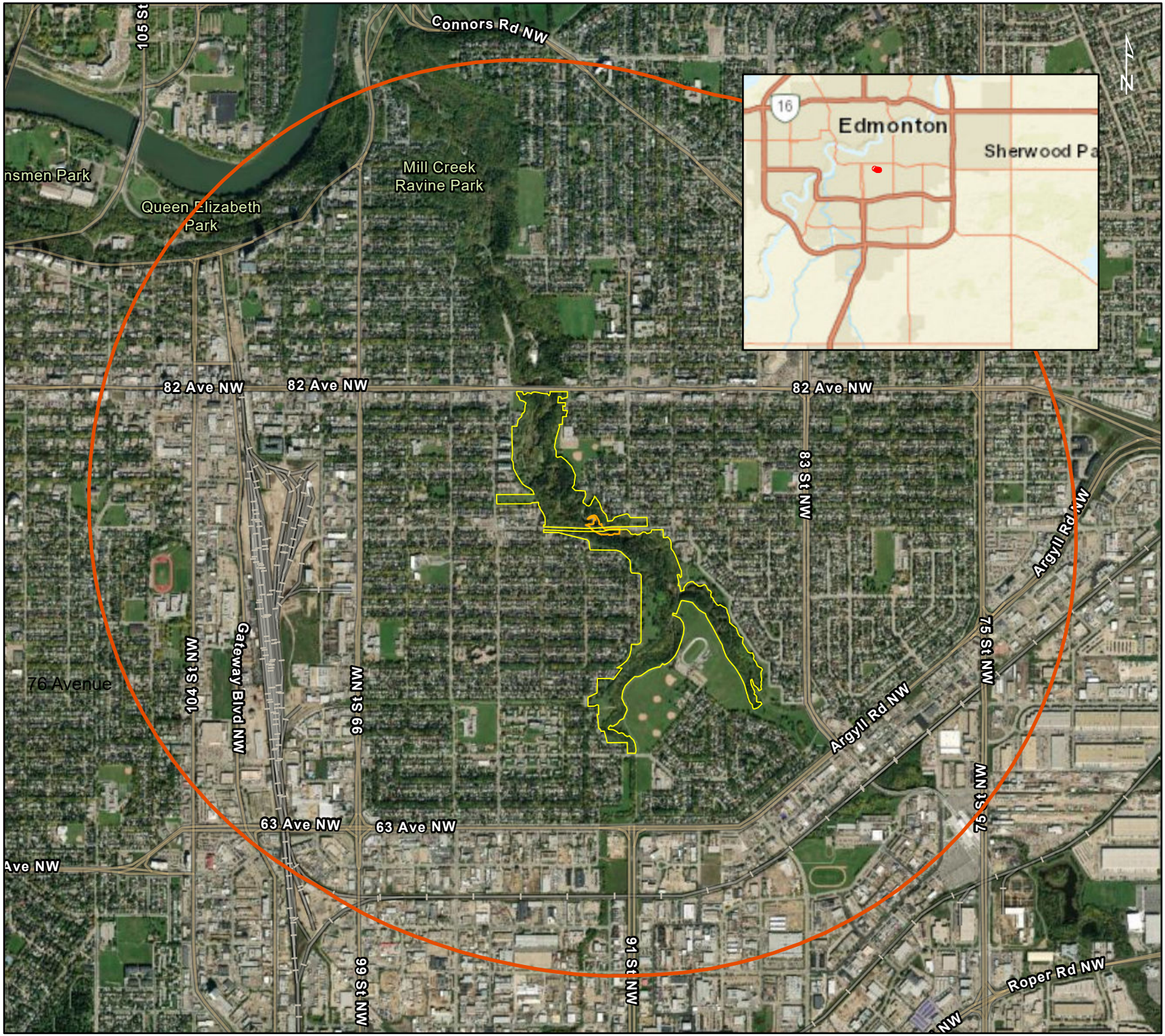
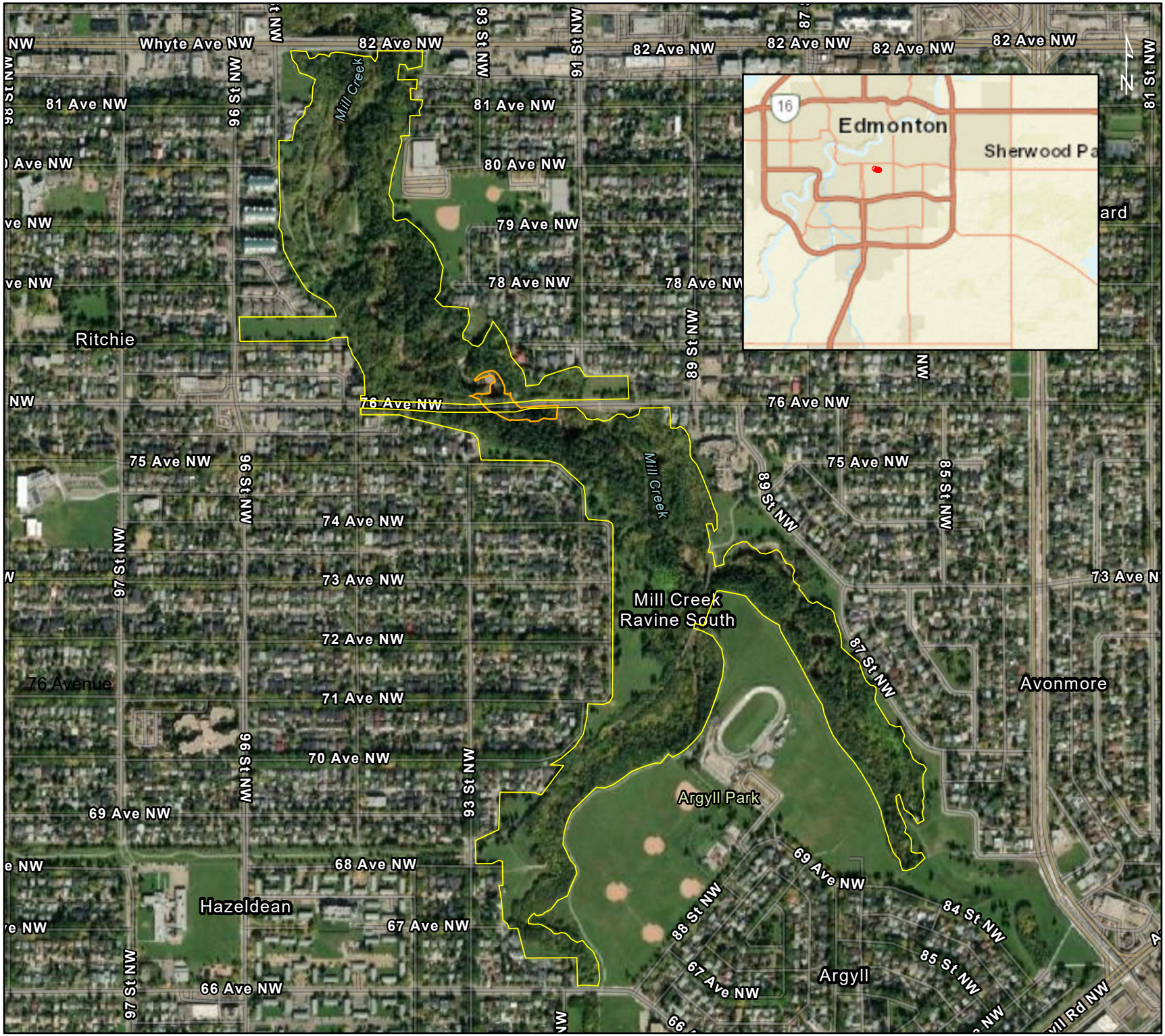


FIGURE 2.1
2KM STUDY AREA

ISL


Whyte Ave NW
82 Ave NW
81 Ave NW
80 Ave NW
79 Ave NW
78 Ave NW
76 Ave NW
75 Ave NW
74 Ave NW
73 Ave NW
72 Ave NW
71 Ave NW
70 Ave NW
69 Ave NW
68 Ave NW
67 Ave NW
66 Ave NW
96 St NW
97 St NW
93 St NW
91 St NW
89 St NW
87 St NW
85 St NW
84 St NW
88 St NW
81 St NW
Mill Creek
Ritchie
Mill Creek Ravine South
Argyll Park
Avonmore
Hazeldean
Argyll
76 Avenue
Edmonton
Sherwood Pa
16
Legend
Local Study Area (LSA)
Grading Limits (updated February 2025)
0
20 Kilometers
FIGURE 2.2
LOCAL STUDY AREA
ISL

2.2 Surface Water and Hydrotechnical

A Hydrotechnical Investigation was undertaken for the Project by WSP Canada Inc. (WSP), with a final report submitted May 2024. The report, *Hydrotechnical Services for Trestle Bridge and Culvert, Mill Creek at 76 Avenue, Edmonton, AB* (WSP 2023) is summarized in this section for consideration within this EIA.

The hydrotechnical report includes a full discussion of the hydrotechnical considerations related to the pedestrian trestle bridge, existing culvert, and downstream bank protection. This content was previously included and discussed in the preliminary engineering report by ISL, dated April 2023. The report has been revised to include a discussion of culvert replacement options.

Hydrotechnical modelling was carried out for a replacement culvert along the same alignment as the existing (Option 1). The modeling considered three sub-options: a 6.6 m x 3.4 m box culvert, twin 3.3 m x 3.4 m box culverts, or a 6.5 m x 3.4 m open bottom arch culvert. All three sub-options can convey the 100-year flood event without overtopping 76 Avenue and result in decreased velocities compared to the existing.

The existing culvert at 76 Avenue influences upstream erosion patterns by providing a degree of flow control that moderates velocities and limits erosion in certain areas. However, the culvert also constrains flow, creating localized acceleration that leads to increased turbulence and higher velocities at the outlet. This has contributed to significant scour and erosion downstream, necessitating additional erosion protection measures. While the hydraulic modeling indicates that the culvert plays a role in reducing upstream erosion by restricting peak flow energy, its overall impact on the creek's geomorphology is complex. The culvert's undersized capacity results in backwater effects during high-flow events, which can alter sediment transport and deposition patterns upstream. To ensure long-term stability and reduce both upstream and downstream erosion concerns, the proposed culvert replacement and upstream creek realignment aim to improve flow conveyance while integrating erosion protection measures.

Topographic (land survey) data along with the conceptual realigned Mill Creek upstream of 76 Avenue provided by ISL, were combined with LiDAR and bathymetric data collected by WSP to extract cross-sectional data for hydraulic modeling. A skewed bottom arch culvert 6.8 wide by 3.4 high, was introduced in the realigned creek. The model results show that the arch culvert can convey the 100-year flood without overtopping 76 Avenue and with reduced velocity compared to the existing.

The hydraulic model for the arch culvert option was modified to include a clear span bridge instead. The bridge was assumed to be 35 m long with a structural depth of 1.6 m following the same vertical profile as the existing roadway. Based on this geometry, the hydraulic opening is adequate for the 100-year flood event. This option provides much lower downstream velocities than the existing condition or the two culvert options discussed above.

Rip rap sizing for the box culvert option varies between sub-option from 350 mm minimum at the inlet to 700 mm maximum at the outlet. Similar rip rap sizing of 350 mm at the inlet and 500 mm at the outlet is recommended for the arch culvert. The bridge options would only require rip rap of 150 mm and 70 mm.

Study Recommendations

The two bridge options were considered the most attractive based on hydrotechnical considerations, providing the best passage of drift and freeboard, best potential for wildlife passage, and least requirements to address scour potential. Of the culvert options, the options with greater spans provide better passage of drift and freeboard. Similarly, it is assumed that a broader span and open bottom would be preferred for wildlife passage; the open bottom arch would be expected to perform slightly better than the closed structures from a scour perspective.

2.3 Geotechnical and Soils

2.3.1 Geotechnical Investigation

A Geotechnical Investigation was conducted for the Project by Thurber Engineering Ltd. (Thurber), with a final report submitted April 2023 and a supplement report provided in October 2024. The report, *Mill Creek Trestle Bridge (B034 Replacement) Edmonton, Alberta, Geotechnical Investigation* (Thurber 2023) is summarized in this section for consideration within this EIA, but this section should not be considered a full examination.

A field investigation was conducted in October, 2022, including drilling three test holes drilled to depths ranging from about 11.9 m to 19.5 m below the existing ground surface. All test holes terminated in very hard clay shale bedrock. Standpipe piezometers were installed in the three test holes to allow for future monitoring of the groundwater.

Site geology in the upland areas surrounding Mill Creek Ravine typically consists of glaciolacustrine clay over glacial till with interbedded sand and gravel deposits, overlying Upper Cretaceous clay shale and sandstone bedrock of the Edmonton Formation. Mill Creek is a tributary channel of the North Saskatchewan River that has cut down through the overburden clay and clay till deposits during post glacial times and the channel has incised several metres into the bedrock deposits. Bedrock, consisting of extremely weak, weathered, interbedded clay shale and sandstone are exposed on the banks of Mill Creek channel northeast of the bridge crossing. The bedrock is expected to be present at relatively shallow depths below the base of the river channel and overlain by thin deposits of recent alluvial sand and gravel. Historical photographs and test hole drilling indicate that the bridge abutments are constructed on deep fill consisting of gravel, clay, and sand fill materials.

Slope erosion was observed on the 76 Avenue embankment north slopes, on the east and west sides of the culvert alignment. This erosion has resulted in near vertical scarps about 2 m in height which have exposed portions of the existing bridge timber foundations. There is evidence of shallow slope instabilities on the roadway embankment slopes.

Toe erosion has resulted in a vertical scarp about 4 m in height on the east creek bank immediately downstream of the trestle bridge. The erosion extends along the east bank to the north around the adjacent bend of the creek. Remediation of the slope is recommended with options discussed in the full report, noting that the Hydrotechnical Investigation examined the issue thoroughly.

Study Recommendations

Measures to mitigate against further slope failure include conducting slope construction from the trails above where possible. Where it is necessary to access the slopes, any benching at the toe of slopes should be properly assessed to ensure that there is acceptable short-term factor of safety during construction. This may include the need for temporary support of bench cuts using tie backs or soil nails during construction depending on the width and height of the slope cut. In general, working from a berm constructed across the creek, or construction off the existing bridge during winter would be preferable in terms of maintaining stability of the existing slopes. Foundation types for the bridge replacement are discussed in the report. Recommended options include cast in place concrete piles – abutments; and piers and driven steel piles – abutments only.

2.3.2 Potential Soil Contamination

A Phase II ESA was completed by Thurber as was an Environmental Engineering File Review was undertaken by the City of Edmonton's Integrated Infrastructure Services in October 2022. A Memorandum titled: *Mill Creek Trestle Bridge B034 Environmental Engineering File Review* was issued summarizing potential presence of contaminated soils in the Project Area (CoE 2022c). It concluded that as hydrocarbon and metal content exceeding Alberta Tier I guidelines were likely present in the soils, and any fill materials or stained soils excavated during the project should be segregated and tested to determine appropriate disposal options.

2.4 Vegetation

2.4.1 Desktop Assessment

Central Parkland Natural Subregion

The Parkland Natural Region has been strongly influenced by agriculture for greater 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 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).

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. Two (2) historical ACIMS occurrences are within this 2km Study Area (a bryophyte called Ontario Rhodobryum moss [*Rhodobryum ontariense*; Ranked S1S2] and an invertebrate called Creeping Ancylid [*Ferrissia rivularis*; Ranked SU]). Rare vascular plant species and rare ecological communities known to occur within the Central Parkland Natural Subregion are provided in Appendix C.

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 2.3 on the following page.

Regionally Significant Habitat

The Project is not located within or in close proximity (*i.e.* 5.0 km) to any:

- Ramsar Wetlands of International Importance (Bureau of the Convention on Wetlands 2014)
- Migratory Bird Sanctuaries (ECCC 2022)
- World Biosphere Reserves (UNESCO 2018)
- Western Hemisphere Shorebird Reserves (Western Hemisphere Shorebird Reserve Network 2019)
- Important Bird Areas (Bird Studies Canada and Nature Canada 2015)
- National Wildlife Areas (ECCC 2022a)
- Ducks Unlimited Canada Projects (DUC 2022);
- Alberta Provincial Parks and Protected Areas (Alberta Parks 2021)

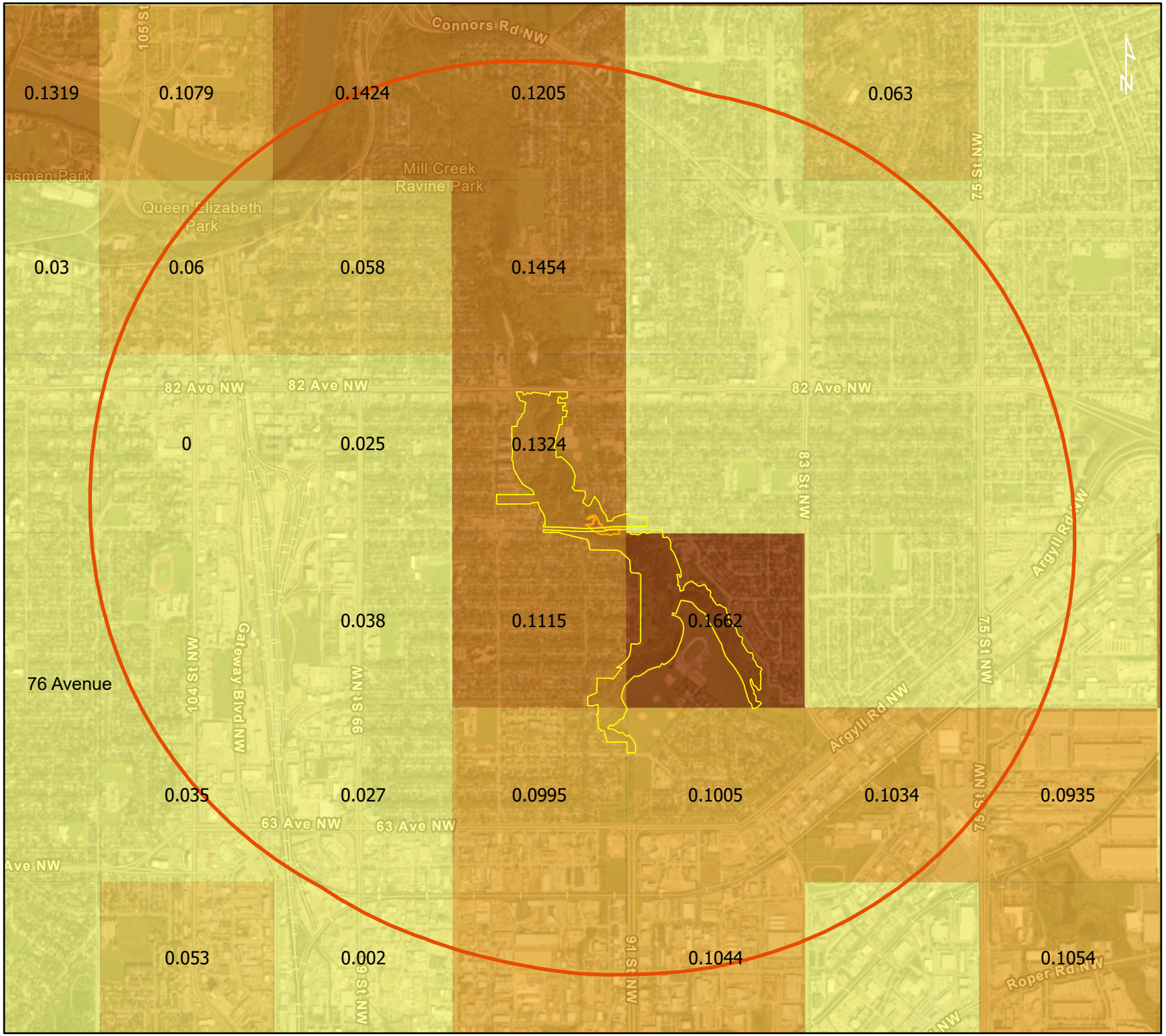


FIGURE 2.3
PROVINCIAL ENVIRONMENTALLY SIGNIFICANT AREAS

2.4.2 Field Assessment

Methods

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 1.1). 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.

Results

Observed Species

Native plant species observed on October 5, 2022 and June 1, 2023 field assessment are provided in Appendix C. The 2022 field assessment occurred outside of the accepted timeframe and was followed up with a supplemental visit in the spring of 2023 to cover the full growing season.

Weeds

There were 22 weed species including six Noxious (common burdock, scentless chamomile, white cockle, common tansy, Canada thistle, perennial sow-thistle) and one Prohibited Noxious weed species (garlic mustard) observed during the field assessments; see Appendix C for a list of all weed species and Photo Plates 12-18 for photographs.

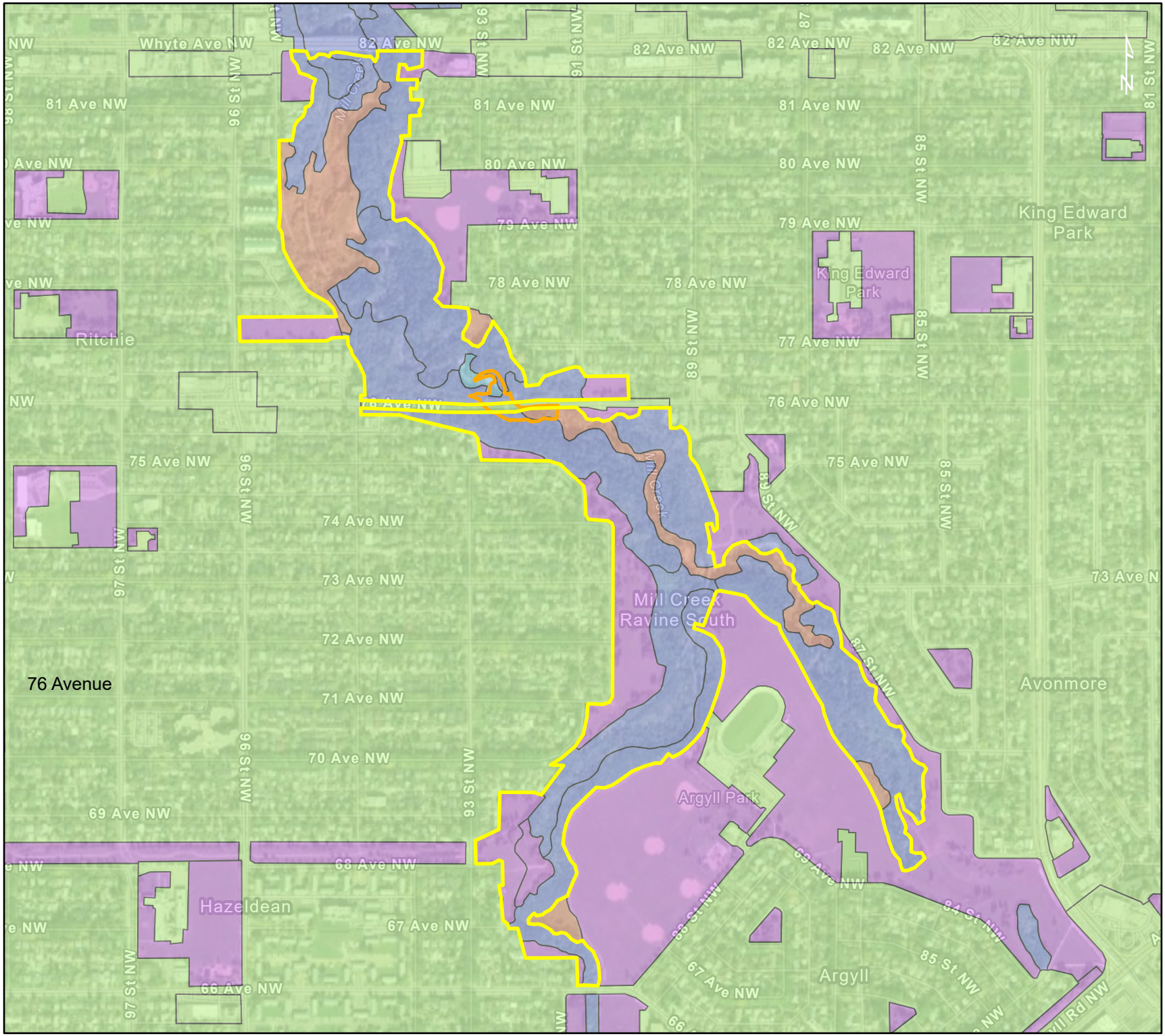
Rare Plants

Two previous occurrences of rare ACIMS species occurrences; a bryophyte and an invertebrate, have been recorded in a 2km 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 C.

No rare plants or rare ecological communities were observed on October 5, 2022 or the June 1, 2023 field assessments. The rare plant potential of the Project is considered moderate due to the variety of microhabitats present, however in this urban environment with numerous weed species, the potential for rare plant presence decreases.

Primary Land and Vegetation Inventory

A map of Primary Land and Vegetation Inventory (uPLVI) within the LSA is depicted in Figure 2.4.



Legend

PLVI

- Developed
- Modified
- Natural
- Naturally Non-wooded
- Naturally Wooded
- Wetland
- <all other values>
- Local Study Area (LSA)
- Grading Limits (updated February 2025)

0 20 Kilometers

FIGURE 2.4
PROVINCIAL PRIMARY LAND AND VEGETATION INVENTORY (UPLVI)

ISL

Vegetation Communities

Vegetation communities at the Project was keyed as per the Urban Ecological Field Guide (City of Edmonton 2015), described in Table 2.1 below. The uPLVI dataset (Figure 2.4), shows the primary canopy species polygons in the Mill Creek Ravine (City of Edmonton 2016).

Table 2.1: Vegetation Communities in Study Area

Vegetation Community Code[3]	Location	Typical Tree Species	Typical Shrub Species[1,2]	Typical Understory Species (Forbs, Grasses)
n/a	77 Ave Temporary Workspace	n/a	N/a	Kentucky bluegrass, common dandelion
SW4 White spruce/ European Mountain-ash – herb poor	South of 76 Ave	White spruce, European mountain ash, aspen, balsam poplar	Cotoneaster, prickly rose, beaked hazelnut, Red-osier dogwood, choke cherry	Canada thistle
PB3 Balsam Poplar/ Red-osier dogwood	North of 76 Ave	Balsam Poplar, Manitoba maple and Aspen	Red-osier dogwood, wild red raspberry, western snowberry, prickly rose, choke cherry, low bush-cranberry	Canada thistle, smooth brome

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).

2.5 Wildlife

2.5.1 Desktop Assessment

The Desktop Assessment entailed a review of the Project Area as well as publicly available materials by an Experienced Wildlife Biologist (EWB). The Project Area is located in a region identified by City of Edmonton's Ecological Network as a Biodiversity Core Area (City of Edmonton 2022d).

A review of digital aerial imagery was conducted to assess habitat occurring within or near the Project Area and Alberta Environment and Protected Areas (AEPA) 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 Area (ESRI 2020; AEPA 2022). Wildlife species which may reside within the Project Area based on their known habitat preferences were determined with desktop methods by reviewing the Fish and Wildlife Management Information Tool (FWMIT) sensitive wildlife layer and species occurrence history (AEPA 2022). The search of species occurrence history within the Project Area was conducted on November 3, 2022; the results are provided in Table 2.2. Their conservation statuses were determined using the Alberta Wild Species General Status Listing - 2015 (AEPA 2020), the *Alberta Wildlife Act* (AWA) (Government of Alberta 2000), and the *Species at Risk Act* (SARA) (Government of Canada 2002).

A national map of bird nesting periods from Environment Canada was searched to determine nesting periods of migratory avian species within the Project Area (ECCC 2018).

Table 2.2: FWIMT Search

Common Name	Scientific Name	SARA[1]	AWA[2]	Alberta General Status (AEPA 2020)[3]
Brown Creeper	*Certhia americana*	Not Listed	Not Listed	Sensitive; A mature forest-dependent species that is vulnerable to forest fragmentation, and certain forest management practices.
Canadian Toad	*Anaxyrus hemiophrys*	Not Listed	Not Listed	May be at Risk; Once common in boreal and parkland habitats. Dramatic declines in population and distribution, but population monitoring ongoing. Habitat threatened by drought, conversion, agricultural chemicals, and oil and gas activities.
Northern Goshawk	*Accipiter gentilis*	Not Listed	Not Listed	Sensitive; Logging, industrial development, and human encroachment on nesting habitat may reduce populations in the boreal forest. Maintenance of mature forest breeding habitat needs to be incorporated into forest planning on both public and private lands.
Peregrine Falcon	*Falco peregrinus*	Special Concern	Threatened	At Risk; Recovery of species is fueled by declining pesticide levels in prey. Susceptible to nest disturbance and environmental contamination. Protection of wetland areas important.

1. SARA - Species At Risk Act (Government of Canada 2002).
2. AWA - Alberta Wildlife Act (Government of Alberta 2024).
3. GSAWS - General Status of Alberta Wild Species 2020 (Government of Alberta 2020).

Based on desktop and field data combined with known habitat requirements and distributional ranges, a list of 63 vertebrate Wildlife Species of Conservation Concern was compiled. These species have the potential to occur within the Project Area and spend some portion of their life cycle as resident, breeding, or overwintering. These species are listed in Appendix D and include two reptiles, two amphibians, 53 birds, and six mammal species.

2.5.2 Field Assessment Methodology

ISL conducted surveys that were feasible based on the time of year the project was awarded, the timing of design decisions, and the existing habitat on site. Therefore, while these assessments did not follow all guidelines within the Sensitive Species Inventory Guidelines (AEPA 2013), we anticipate that they meet the intent of the Project to protect wildlife. Additional surveys could be completed where requested by the City, however note that additional wildlife protection will occur during construction through appropriate mitigation measures.

Raptor stick nest surveys and wildlife habitat assessments were conducted on September 27, 2022 and again on June 1, 2023. Surveys were conducted focusing on sensitive species documented in the preliminary FWMIT search for the Project which identified the Sensitive Raptor Range and the Sharp-tailed Grouse Lek Survey Area as overlapping with the Project Area. In consultation with the local AEPA wildlife biologist for the area (Corey Smereka), the requirement of a formal sharp-tailed grouse (STGR) survey was waived due to the lack of STGR habitat within 1 km of the Project Area (personal communication, included in Appendix D).

The raptor stick nest survey was conducted by walking transects throughout both the Project Area and a 1000-meter buffer zone surrounding the Mill Creek Ravine system, with a primary focus on areas containing high-quality habitat. Adjacent areas, with urban infrastructure and housing were not checked, as potential nests in these areas already experience high levels of anthropogenic influence and are not expected to be impacted by activities of the Project. Mature deciduous and coniferous tree stands located within the riparian zone were targeted, as these habitats experience less disturbance, and could house raptor nest sites. This methodology allowed for evaluation of potential nesting and hunting sites. The survey area, including the transects and buffer zones, is illustrated in Figure 2.5.1 Wildlife Assessment Area, which provides a detailed map of the locations assessed during the survey.

In addition to the raptor survey, the Project Area was evaluated for the presence of amphibians. Specific attention was given to aquatic environments, with transects walked along the creek to identify any suitable amphibian habitats. When areas with potential for amphibians were observed—such as water bodies, or specific plant cover—detailed observations were made to detect the presence of amphibians. These observations focused on identifying species of interest, such as frogs, salamanders, or toads that may rely on the creek or riparian zone for their life cycle stages. The Mill Creek Ravine system was further assessed for the suitability of snake and snake hibernacula, bat roosting habitat, mammal denning habitat, raptor and owl habitat, and migratory bird nesting habitat.

2.5.3 Field Assessment Results

Parkland Raptor Survey

One unoccupied stick nest, shown on Figure 2.5, was identified during the raptor stick nest survey on September 27, 2022, approximately 675 meters north of the Project Area on a concrete bridge support.. No raptors were observed in the vicinity; however, several American Crows (*Corvus brachyrhynchos*) were seen feeding under the bridge shown in Photo Plate 19; Appendix H. The nest is believed to belong to a corvid based on the nest shape, construction, and location being on a concrete support girder close to pedestrian traffic. No raptor nests were identified in the June 1, 2023 survey. Hunting sites were determined to be present along the ravine system, where small mammals, birds, and amphibians are likely to be the most commonly available prey species, with less hunting opportunities for raptors in urban areas.

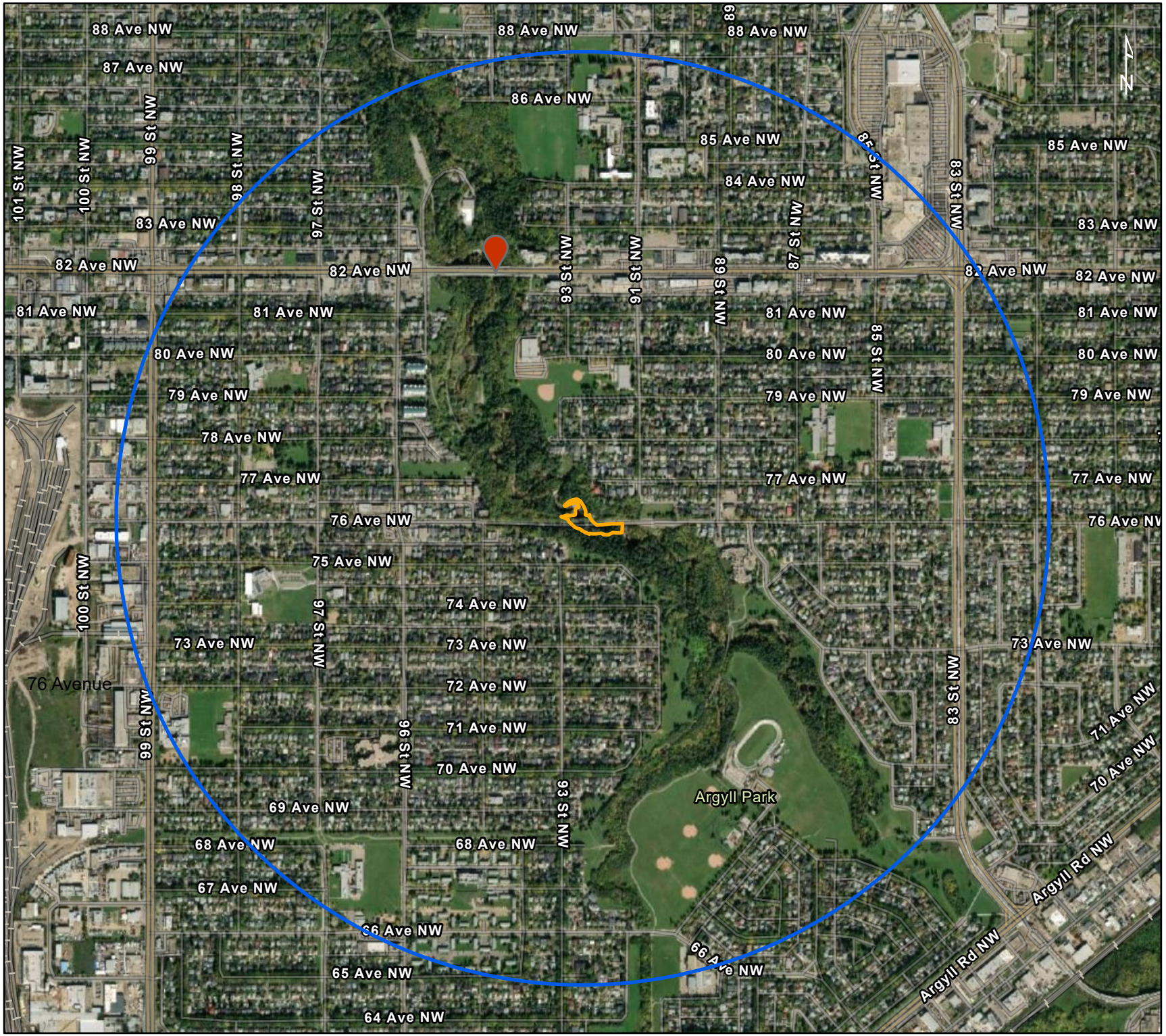


FIGURE 2.5
WILDLIFE ASSESSMENT

Incidental Species Observations

Several species were encountered during the raptor stick nest survey and wildlife habitat assessment on September 27, 2022 and June 1, 2023. A summary of observed incidental species is provided in Table 2.3 and Table 2.4.

Table 2.3: Incidental Species Observations on September 27, 2022

Common Name	Scientific Name	SARA[1]	AWA[2]	Alberta General Status (AEPA 2025)[3]
White-throated Sparrow	*Zonotrichia albicollis*	Not Listed	Not Listed	Secure
Warbling Vireo	*Vireo gilvus*	Not Listed	Not Listed	Secure
Least Flycatcher	*Empidonax minimus*	Not Listed	Not Listed	Sensitive
Black-capped Chickadee	*Poecile atricapillus*	Not Listed	Not Listed	Secure
White-breasted Nuthatch	*Sitta carolinensis*	Not Listed	Not Listed	Secure
Tree Swallow	*Tachycineta bicolor*	Not Listed	Not Listed	Secure
House Finch	*Carpodacus mexicanus*	Not Listed	Not Listed	Secure
Black-billed Magpie	*Pica hudsonia*	Not Listed	Not Listed	Secure
Bohemian Waxwing	*Bombycilla garrulus*	Not Listed	Not Listed	Secure
Common Raven	*Corvus corax*	Not Listed	Not Listed	Secure

1. SARA – Canadian Species at Risk Status (COSEWIC 2025)
2. AWA - Alberta Wildlife Act (Government of Alberta 2024)
3. GSAWS - General Status of Alberta Wild Species 2020 (AEPA 2025)

Table 2.4: Incidental Species Observations on June 1, 2023

Common Name	Scientific Name	SARA[1]	AWA[2]	Alberta General Status (AEPA 2025)[3]
American Robin	Turdus migratorius	Not Listed	Not Listed	Secure
Blue jay	Cyanocitta cristata	Not Listed	Not Listed	Secure
Black-billed Magpie	*Pica hudsonia*	Not Listed	Not Listed	Secure
Bohemian Waxwing	*Bombycilla garrulus*	Not Listed	Not Listed	Secure
Black-capped Chickadee	*Poecile atricapillus*	Not Listed	Not Listed	Secure
Brewer's blackbird	Euphagus cyanocephalus	Not Listed	Not Listed	Secure

Common Name	Scientific Name	SARA[1]	AWA[2]	Alberta General Status (AEPA 2025)[3]
Canada Goose	Branta canadensis	Not Listed	Not Listed	Secure
Common Raven	*Corvus corax*	Not Listed	Not Listed	Secure
European starling	Sturnus vulgaris	Not Listed	Not Listed	Exotic/Alien
Franklins gull	Leucophaeus pipixcan	Not Listed	Not Listed	Secure
House Finch	*Carpodacus mexicanus*	Not Listed	Not Listed	Secure
House sparrow	Passer domesticus	Not Listed	Not Listed	Exotic/Alien
Mallard	Anas platyrhynchos	Not Listed	Not Listed	Secure
Northern flicker	Colaptes auratus	Not Listed	Not Listed	Secure
Northern Pintail	Anas acuta	Not Listed	Not Listed	Secure
Rock pigeon	Columba livia	Not Listed	Not Listed	Exotic/Alien
Red-breasted Nuthatch	*Sitta canadensis*	Not Listed	Not Listed	Secure
White-throated Sparrow	*Zonotrichia albicollis*	Not Listed	Not Listed	Secure
Warbling Vireo	*Vireo gilvus*	Not Listed	Not Listed	Secure

1. SARA – Canadian Species at Risk Status (COSEWIC 2025)
2. AWA - Alberta Wildlife Act (Government of Alberta 2024)
3. GSAWS - General Status of Alberta Wild Species 2020 (AEPA 2025)

The incidental species observations on September 27, 2022, and June 1, 2023, highlighted a variety of bird species in the area. All observed species were classified as "Secure" under Alberta's General Status (AEPA 2025), indicating stable populations, with the exception of the Least Flycatcher, observed on the September 2023 visit, which is considered "Sensitive." No species observed are listed under SARA or the AWA. Additionally, some non-native species, including the House Sparrow, European Starling, and Rock Pigeon, were noted as "Exotic/Alien" on June 1, 2023. These observations reflect a mix of stable local populations and a presence of some non-native species.

2.5.4 Wildlife Habitat Assessment Results

The wildlife habitat assessment entailed an assessment of habitat quality and the potential for wildlife nesting or denning sites to be found within the Project Area (e.g., Bank Swallow [*Riparia riparia*] nesting areas, raptor nesting features, burrowing mammal denning area, and bat or snake hibernacula sites).

The Project Area was surveyed using aerial imagery and on foot for suitable nesting, amphibian, and denning habitat. The Project Area is characterized by riparian, human use, and parkland vegetation as well as introduced weedy species. Manicured lawns, walking pathways, and extensive alterations dot the ravine and surrounding park.

Amphibian Habitat Assessment

No evidence of amphibians was observed during the survey of representative amphibian habitats within the Mill Creek Ravine system during the 2022 or 2023 field visits. o The timing of the survey may have impacted the detection of amphibians, as many species, including frogs and toads, are most vocal during their breeding seasons, which occur earlier in the year when temperatures and moisture levels are conducive to their activities.

Despite the lack of observed amphibians during this survey, Mill Creek Ravine is known to support a variety of amphibian species, and there is potential that the area serves as a breeding ground for species such as the Canadian toad (*Anaxyrus hemiophrys*), Boreal Chorus Frog (*Pseudacris maculata*), the Tiger Salamander (*Ambystoma mavortium*), and the Wood Frog (*Lithobates sylvaticus*). These species are commonly found in the region and are adapted to the creek's environment, i

Given the diversity of habitats in the Mill Creek area there is moderate to high potential for amphibian breeding, particularly during the seasonally appropriate time periods when conditions are optimal for amphibian reproduction and activity. The ravine system's natural features, including its riparian zones, provide ideal habitats for these species, especially when seasonal conditions are favorable. Therefore, while the field surveys did not capture evidence of amphibian presence, the area remains an important site for amphibian populations.

Migratory Bird Nesting Habitat Assessment

The riparian and woodland habitat types within the Project Area were assessed as suitable for a variety of migratory species, particularly passerines and near-passerine species such as woodpeckers. The diversity of habitat types, including grasses, shrubs, immature deciduous trees, and sparsely located mature coniferous trees, provides ideal conditions for nesting passerines. This area is considered moderate to high for use by migratory passerine species during the nesting window (Zone B4: mid-April to late August; ECCC 2025; Photo plate 17 and 18; Appendix H). The habitat features within 100 meters of the Project Area offer the necessary resources, including shelter and food, to support migratory bird populations during their nesting season.

The steep bankss adjacent to the Mill Creek Ravine system may provide nesting sites for Bank Swallows, which rely on vertical, sandy or muddy banks for burrow excavation, however no nesting sites were observed during the site assessment.

Raptor and Owl Nesting Habitat Assessment

Mature coniferous and deciduous trees in the riparian and woodland habitat types provide important nesting features for raptors and owls, such as the Great Horned Owl and Saw-whet Owl (*Aegolius acadicus*). These mature trees offer the necessary structure for nesting, but such habitat types are not dominant within the Study Area (Photo plate 15; Appendix H). The upland areas within the Project Area and its 100-meter buffer zone are primarily dominated by immature mixed wood stands, which are less suitable for raptor and owl nesting. The predominance of immature trembling aspen (*Populus tremuloides*), smaller mixed wood stands, and human-use areas contribute to a habitat that is considered low to moderate for nesting raptors, including species like the Great Horned Owl, Red-tailed Hawk, and other birds of prey (Photo plate 16; Appendix H). While the area may provide occasional nesting opportunities for raptors and owls, the lack of mature, suitable trees and the prevalence of younger, less structurally diverse vegetation make it less than ideal for large-scale or consistent raptor or owl nesting. The presence of such species would likely be sporadic, relying on specific, localized trees or perches within the area.

Furthermore, it has been internally communicated by the City of Edmonton that a Saw-whet owl was reported to be nesting within approximately 50 meters of the project footprint, with nestlings present at the time of the report. Saw-whet owls typically nest from around March to July, which is included in the regional nesting period recommended for this Project. During this time Saw-whet owls rely on forested areas with dense vegetation and tree cavities for nesting and raising their young.

Mammal Denning Habitat Assessment

The riparian and woodland habitat types within the Project Area, along with the 100-meter buffer, were surveyed to assess potential mammal denning sites. No direct evidence of mammal dens was observed during the habitat assessment. However, formal mammalian den surveys, which typically involve more specialized techniques and are conducted during specific seasons, were not part of this survey's scope. Despite the lack of observed dens, the Project Area and its surrounding 100-meter buffer exhibit a high level of ecological activity and are dominated by native vegetation, providing ample resources for a variety of wildlife species. Numerous plant stands, which serve as forage for porcupines and other medium-sized herbivorous mammals, contribute to the overall ecological richness of the area (Photo Plate 20; Appendix H).

Given the healthy ecosystem and the diversity of vegetation, the Project Area and 100-meter buffer are considered to have moderate to high potential for supporting denning mammals, including Porcupines (*Erethizon dorsatum*), Skunks (*Mephitis mephitis*), Coyotes (*Canis latrans*), and Deer species. The City has indicated that there is a known Coyote den located within 100m of the Project area.

Bat Roosting Habitat Assessment

The riparian and wooded habitats in the area also provide important roosting sites for tree-dwelling bat species. These habitats support various bat species, such as the Little Brown Bat (*Myotis lucifugus*) and the Big Brown Bat (*Eptesicus fuscus*), which rely on mature forests and riparian corridors for shelter and foraging. No guano was observed under trees during either survey; however, it was observed on June 1, 2023 that recent rain events may have washed away evidence of bats. The absence of guano is not necessarily an indicator of bat presence. Given the habitat conditions, the Project Area and 100-meter buffer are considered moderate to high potential habitats for bat species, further emphasizing the ecological importance of this area for a wide range of urban wildlife.

Snake and Snake Hibernacula Habitat Assessment

The Project area was determined to be of low habitat quality for snakes and snake hibernacula, primarily due to the environmental conditions and habitat features present in the area. The Mill Creek Ravine system is known to experience seasonal flooding, which can significantly impact the availability of suitable habitat for snakes, particularly for species that rely on stable, dry conditions for both foraging and hibernation. Flooding may disrupt snake activity by reducing the accessibility of key foraging areas and nesting sites, as well as altering the composition of vegetation in the ravine.

In addition, potential for flooding can affect snake hibernacula, which are critical sites used by snakes for overwintering. These hibernation sites need to offer stable microhabitats, such as dry, sheltered areas with sufficient insulation to protect the snakes from freezing temperatures. The seasonal flooding in the Mill Creek Ravine can create an unstable environment for hibernacula, either washing away potential sites or submerging them in water for extended periods. This variability in habitat quality makes it less suitable for snake populations that require consistent and safe hibernation conditions.

Additionally, the dense vegetation and riparian features within the ravine, while providing some cover for snakes during active seasons, may not be ideal for species that prefer open, undisturbed habitats. The presence of human activity, along with potential disturbances from nearby roads and urban areas, further reduces the overall quality of habitat for snakes and increases the risk of mortality. Due to these factors, the Project area is considered to have low potential for supporting snake populations or hibernacula, especially for species that require stable, dry conditions for breeding and overwintering.

2.5.5 Wildlife Corridors and Connectivity

The Project Area, specifically the habitat surrounding the Mill Creek Pedestrian Bridge and the adjacent 76 Avenue corridor, was assessed for wildlife passage. This area is situated in an ecologically sensitive zone in Edmonton, where wildlife movement is a key consideration, particularly in maintaining connectivity between habitats on either side of 76 Avenue. The existing culvert structure under 76 Avenue was evaluated to determine its potential as a wildlife passage. However, it was found that the culvert lacks sufficient height to accommodate most large mammals that might inhabit the area, thereby limiting their ability to cross under the roadway.

While the culvert may allow for limited passage of medium-sized species, such as Coyotes, especially during times of low water levels or when water in the culvert is frozen, it is not considered suitable for larger mammals. Ungulate species or larger carnivores would face significant barriers to movement through this structure due to its limited dimensions. As a result, larger mammals or carnivores are more likely to cross 76 Avenue above ground, using the roadway or surrounding areas, which poses potential risks to both wildlife and human safety.

2.6 Fish and Fish Habitat

2.6.1 Desktop Assessment

Fish Inventory

A search of the FWMIS database reported two non-sportfish species occurrences historically found within the Study Area, provided in Table 2.4. The FWMIT report is provided in Appendix E.

Table 2.4: Wildlife Species with Historical Occurrences in the 2 km Study Area

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

1. Listing on Alberta General Status (AEPA 2025).
2. SARA Species Status Search (Government of Canada 2002)

Watershed

Mill Creek is a minor tributary to the North Saskatchewan River and is an important feature within Edmonton's River Valley and Ravine System. Between the 1960s and 1970s, the most downstream reach of Mill Creek was diverted into a tunnel, and now discharges from an outfall approximately 5 m above the North Saskatchewan River, precluding any fish migration from the North Saskatchewan River (City of Edmonton, 2016a). While the City has identified the restoration of the connectivity between Mill Creek and the North Saskatchewan River as a key priority, restoration has not occurred to date. Based on the lack of connectivity, Mill Creek does not provide any sportfish habitat. The lack of connectivity supports AEPAs classification of Mill Creek as a Class D waterbody, considered of Low fisheries values (AESRD 2012).

2.6.2 Field Assessment

Methods

An open water aquatic assessment was completed by a Fisheries Biologist with a Professional Biologist designation (P. Biol.) on October 22, 2022.

The objectives for the aquatic assessments included:

- Documenting fish use, aquatic habitat condition and habitat potential in the area of each proposed crossing;
- Identify 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 m upstream to 300 m downstream of the watercourse crossing (i.e., the potential Zone-of-Influence due to Project construction). The final length of the study reach was determined by the P.Biol, who took into account any constraints, stream gradient, channel width, channel depth and morphology, flow velocity and potential Project disturbances. Four transects were completed, one at 100 m upstream of the existing crossing, one located at the existing crossing, one at 100 m downstream and one at 300 m downstream. At each transect, substrate types were visually assessed based on substrate size, substrate type (i.e., 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 recorded. Channel (i.e., bankfull) width, wetted width, bank height and water depth were recorded utilizing a survey-staff to the nearest 0.1 m. Time, dates, location and transects were recorded at each assessment location utilizing a handheld GPS.

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 2.5). Habitat ratings were limited to non-sportfish only, as sportfish are not present within Mill Creek.

Table 2.5: Fish Habitat Suitability Ratings

Habitat Suitability Rating	Description
Excellent	All habitat present is considered to be 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 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 completed for the entire assessed area to provide information on the macro-habitat types within the area. Habitat mapping was completed following the Alberta Transportation Fish and Fish Habitat Inventory Procedures, following the Small River Stream Habitat Classification System (Alberta Transportation 2009). Habitat types, location and extents were identified by the P. Biol during the field assessment and recorded utilizing a mapping tablet. Habitat mapping was transferred to desktop ArcGIS, and the amount of instream area of each discrete habitat type was calculated. It should be noted that the transcription process to ArcGIS provides some potential overlap of areas, such that these area values may be slightly overestimated.

Results

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

Bankfull channel widths ranged from 6 m to 12 m, with an average width of 8 m. Water levels ranged from 0.2 m in riffles, to greater than 1.0 meter in areas that had been scoured downstream of the culvert. The reach is vegetated with grasses and forbs, willows species and aspen providing moderate overhead cover. Substrates throughout the reach varied depending on the habitat type. The slower areas (pools and flats) consisted mostly of fines and organics, with intermittent sections of gravels and cobbles in riffle and run areas. The adjacent downstream bridge has significant riprap protecting the abutments.

The Environmental Quality Guidelines for Alberta Surface Waters (Government of Alberta 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 5 ºC, the pH was 8.5, with 11.1 mg/L of dissolved oxygen and 1054 µS/cm of electrical conductivity, and therefore met all guidelines. The creek was considered non-turbid.

Habitat ratings for the study area were considered “Good” for spawning, rearing, feeding for non-sportfish, and ‘Moderate to Good’ for migration due to no migration barriers. 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 within Mill Creek, and are precluded by a perched outfall at the North Saskatchewan River.

Habitat Mapping

Habitat mapping was completed as part of the field assessment for the studied reach of Mill Creek to determine the variety and extent of habitat units available in the creek for fish and fish habitat.

A distribution of habitat type, calculated by surface area (m^2), for the study reach is presented in Table 2.6 and Figure 2.6. The majority of habitat within the reach are riffles and flats, which is typical of Mill Creek. The majority of the watercourse is flats and riffles, with the largest pool occurring immediately downstream of the existing culvert. This large pool is located below the culvert due to scour, and therefore is deeper in depth than what would normally be anticipated for Mill Creek. These areas would provide good variety of habitat for the various non-sportfish that are present within Mill Creek. Extensive bank erosion has occurred on the downstream right bank, and significant gravel has been deposited in these areas.

Table 2.6: Fish Habitat Inventory

Section Type	Details	Area (m^2)	% of total
CA	Cascade	36	2.2
RF	Riffle	689	41.6
F2	Class 2 Flat	354	21.4
F3	Class 3 Flat	129	7.8
P1	Class 1 Pool	202	12.2
P2	Class 2 Pool	199	12.0
R2	Class 2 Run	49	3.0
	Total	1656	100.0

LEGEND

- Deposition Bar

Vegetation

- Grass / Forbes
- Mixedwood Forest

Creek Section

- Culvert
- Cascade 36.14 m^2
- Riffle (<0.5 m depth) 688.76 m^2
- Class 2 Flat (0.5 to 1.0 m depth) 354.20 m^2
- Class 3 Flat (<0.5 m depth) 128.82 m^2
- Class 1 Pool (>1.0 m depth) 202.00 m^2
- Class 2 Pool (0.5-1.0 m depth) 198.76 m^2
- Class 2 Run (0.5-1.0 m depth) 49.09 m^2

Bank Condition

- Gabion Baskets
- Unstable Bank

Rock Type	Code
Gravel	Gr
Large Gravel	LGr
Sand	Sa
Cobble	Co
Silt	Si

TITLE

WATERCOURSE EVALUATION

PROJECT

MILL CREEK TRESTLE BRIDGE (B034) REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: World Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PROJECTION

NAD 1983 CSRS 3TM 114

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1:1,000 Metres

FIGURE	2.6
DATE	2024-12-0
PROJECT NO.	16307
AUTHOR	vklassen

Document Path: \\192.168.4.94\elc\Shared\GIS\Projects\16307_MillCreekTrestleBridge\16307_MillCreekTrestleBridge.aprx

LEGEND

- Deposition Bar

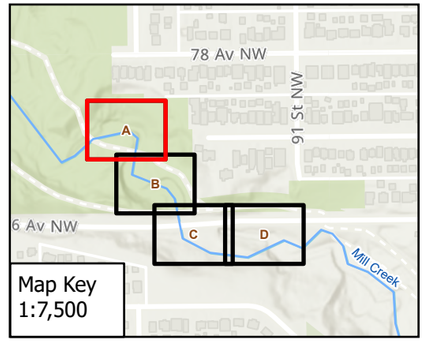
Vegetation

- Grass / Forbes
- Mixedwood Forest

Creek Section

- Cascade
- Riffle (<0.5 m depth)
- Class 2 Flat (0.5 to 1.0 m depth)
- Class 2 Pool (0.5-1.0 m depth)

Rock Type	Code
Sand	Sa
Silt	Si



TITLE

WATERCOURSE EVALUATION DETAIL
PAGE 1 OF 4

PROJECT

MILL CREEK TRESTLE BRIDGE (B034) REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: World Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

PROJECTION

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1:300 Metres

FIGURE	2A
DATE	2024-12-06
PROJECT NO.	16307
AUTHOR	vklassen

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LEGEND

- Deposition Bar

Vegetation

- Mixedwood Forest

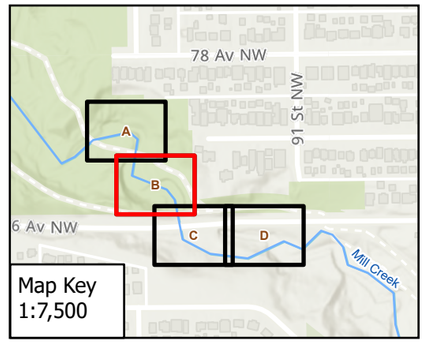
Creek Section

- Culvert
- Cascade
- Riffle (<0.5 m depth)
- Class 2 Flat (0.5 to 1.0 m depth)
- Class 3 Flat (<0.5 m depth)
- Class 1 Pool (>1.0 m depth)
- Class 2 Pool (0.5-1.0 m depth)
- Class 2 Run (0.5-1.0 m depth)

Bank Condition

- Unstable Bank

Rock Type	Code
Gravel	Gr
Large Gravel	LGr
Cobble	Co



TITLE

WATERCOURSE EVALUATION DETAIL
PAGE 2 OF 4

PROJECT

MILL CREEK TRESTLE BRIDGE (B034) REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: World Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

PROJECTION

NAD 1983 CSRS 3TM 114

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FIGURE	2B
DATE	2024-12-06
PROJECT NO.	16307
AUTHOR	vklassen

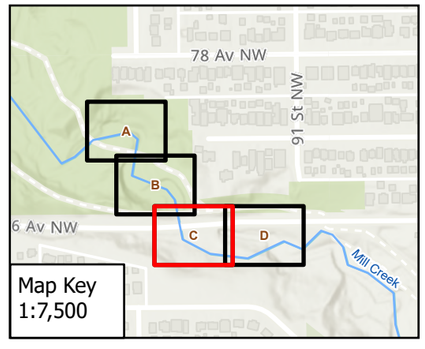
Document Path: \\192.168.4.94\elc\Shared\GIS\Projects\16307_MillCreekTrestleBridge\16307_MillCreekTrestleBridge.aprx

LEGEND

Vegetation
- Mixedwood Forest

Creek Section
- Culvert
- Riffle (<0.5 m depth)
- Class 2 Flat (0.5 to 1.0 m depth)
- Class 1 Pool (>1.0 m depth)

Bank Condition
- Gabion Baskets
- Unstable Bank



TITLE

WATERCOURSE EVALUATION DETAIL
PAGE 3 OF 4

PROJECT

MILL CREEK TRESTLE BRIDGE (B034) REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: World Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

PROJECTION

NAD 1983 CSRS 3TM 114

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1:300 Metres

FIGURE	2C
DATE	2024-12-06
PROJECT NO.	16307
AUTHOR	vklassen

Document Path: \\192.168.4.94\e\cShared\GIS\Projects\16307_MillCreekTrestleBridge\16307_MillCreekTrestleBridge.aprx

LEGEND

Deposition Bar

Vegetation

Mixedwood Forest

Creek Section

Riffle (<0.5 m depth)

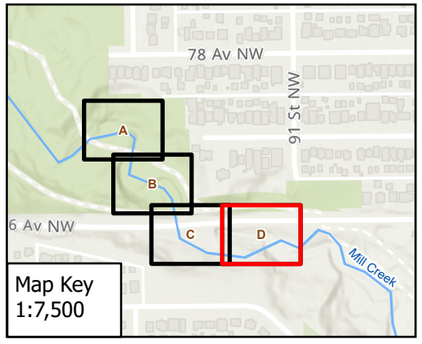
Class 3 Flat (<0.5 m depth)

Class 2 Pool (0.5-1.0 m depth)

Bank Condition

Gabion Baskets

Rock Type	Code
Gravel	Gr
Cobble	Co



TITLE

WATERCOURSE EVALUATION DETAIL
PAGE 4 OF 4

PROJECT

MILL CREEK TRESTLE BRIDGE (B034) REPLACEMENT

CLIENT

CITY OF EDMONTON

DATA SOURCES

- Topographic Map: World Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

PROJECTION

NAD 1983 CSRS 3TM 114

0 2.5 5 10

1:300 Metres

FIGURE	2D
DATE	2024-12-06
PROJECT NO.	16307
AUTHOR	vklassen

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2.7 Historical Resources

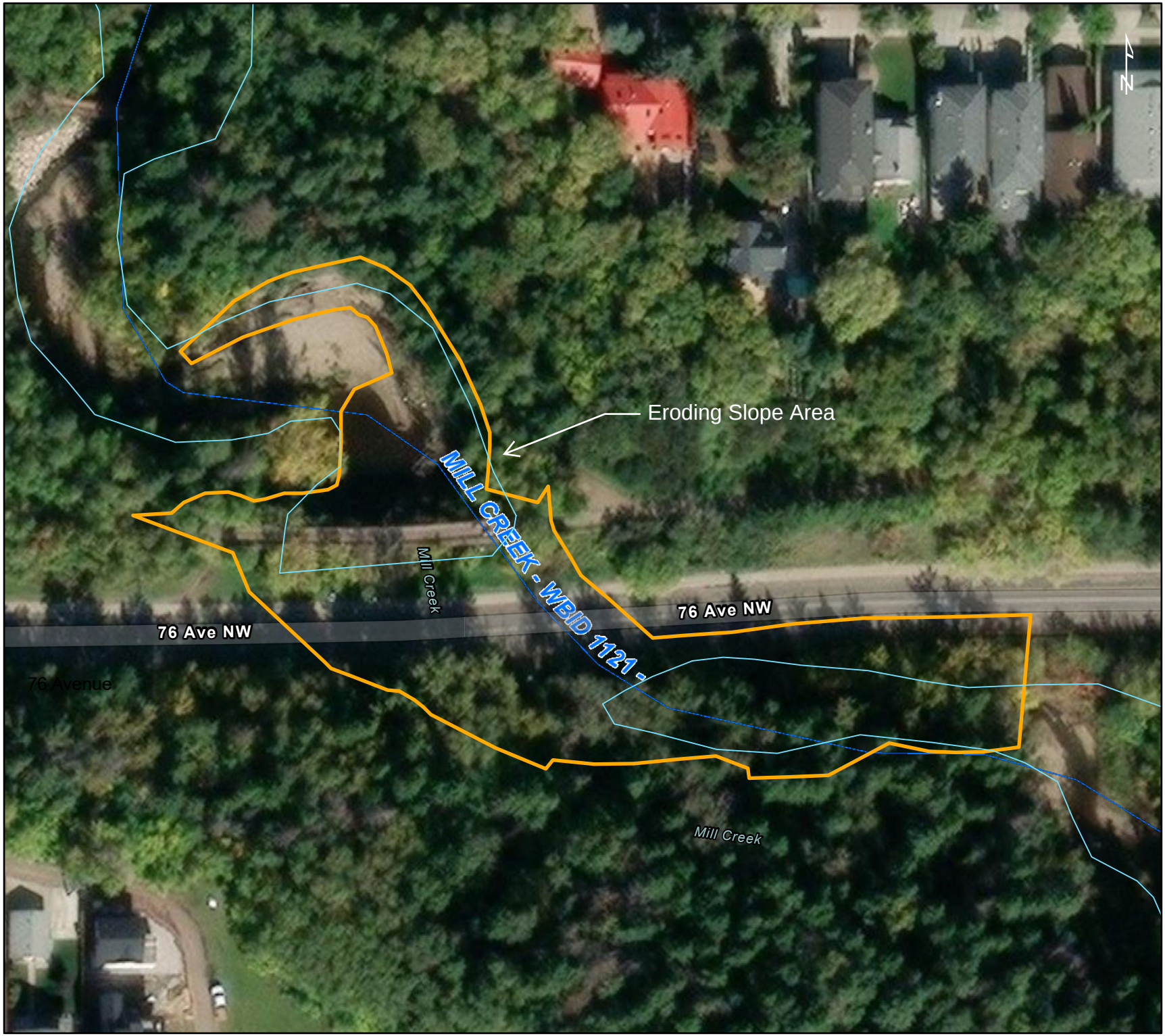
Preliminary investigations for historical cultural resources have been conducted by Turtle Island Cultural Resource Management Inc. (Turtle Island) and for paleontological resources by Steppe Consulting Inc. (Steppe) for the purposes of submitting an Historical Resources Act Clearance Application to Alberta Culture.

The results of the cultural resources study were that the overall area has been disturbed in previous development including construction of the existing Trestle Bridge and adjacent 76 Avenue roadway and culverts. However, a large quartzite biface (stone knife) was found around the proposed slope repair and was recorded as the cultural resource site FjPi-184 (Turtle Island, 2023). The Project is in lands identified as high potential for cultural resource sites.

The results of the paleontological resources study were that the Project is in lands assigned as having historic resource value of 5 for paleontology including the Mill Creek Paleontological Locale (Steppe, 2023). Potential impact to Cretaceous palaeontological resources related to the Mill Creek Trestle Bridge Replacement Project is high. Satellite imagery and photography indicates the presence of several erosional cliffs with likely bedrock exposures along the of Mill Creek Ravine and the presence of preserved river terrace deposits.

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 F.

Based on the archeological evidence in the immediate area, the high potential for intact cultural resource sites in the overall Mill Creek Ravine, and the high potential for encountering paleontological resources; Turtle Island and Steppe have recommended that a HRIA be conducted. The HRIA was conducted in the fall of 2024 and the results of the study have been submitted to Alberta Culture in January 2025.



Legend

- Mill Creek
- Grading Limits (updated February 2025)

0 0.03 Kilometers

FIGURE 2.8
ENVIRONMENTAL SENSITIVITIES

ISL

2.8 Recreational Resources

2.8.1 Methodology

Recreational use of the Mill Creek Ravine Park and Pathway is well understood by the City, as it is an important resource for recreational users (e.g., dog walkers, runners, mountain bikers). A review of the River Valley Trail Maps was completed by ISL and impacts to recreational access are focused on trail closures and detours. Additional observations of recreational use by walkers, strollers, cyclists and birders were observed by ISL's biologists during their respective field assessments.

2.8.2 Results

The Mill Creek Ravine pathway is a mostly granular pathway that connects to nearby neighborhoods by numerous pathways and stairways, including the nearby Argyll Park, see Figure 2.7 (City of Edmonton 2022e). Multiple linkages exist between the Mill Creek Ravine Pathway and the neighborhoods of Hazeldean and Ritchie to the west, Argyll to the south, and Avonmore and King Edward Park to the east.

Less formal singletrack trails favoured by mountain bikers are also present in the Mill Creek Ravine, in areas adjacent to the Creek. Adjacent to the natural ravine is open manicured park space that support various informal recreational uses. Overall, the area is heavily used by pedestrians, joggers, cyclists, dog-walkers, birders, cross-country skiers in winter, and other recreational users. ISL biologists observed cyclists, dog-walkers, joggers and walking groups using the trail system in the Mill Creek Ravine.

Figure 2.7 Mill Creek Ravine Park and Pathway Recreational Map

The culvert replacement work is proposed to be carried out in conjunction with replacement of the adjacent Mill Creek Trestle Bridge and slope stability improvement work downstream of the crossing. This work will impact pedestrians and cyclists using the 76 Avenue roadway or sidewalk and those using the Mill Creek Ravine trail network.

The proposed detour route (Figure 2.9) would accommodate recreational users and commuters using the upper paved multi-use path, the lower gravel trail, and the 76 Avenue roadway or sidewalk. The detour uses to the closest trails for the shortest possible route. An alternative is also available, using sidewalks of 89 Street and 96 Street to access the 82 Avenue crossing. This alternative is approximately 2.6 km but would be the only accessible route without stairs and/or steep trails. The proposed detour route requires the use of staircases in addition to gravel trails, paved trails, and sidewalks. The following figure shows the local detour.

Both proposed detour routes include sidewalks with 1.5 m width and/or narrow trails. This does not meet the City's minimum widths for shared use listed in the Manual of Temporary Traffic Control (2.0 m minimum for "Slow Zones"). The routes are adequate for pedestrian detouring but would be substandard for combined cyclist/pedestrian use. Cyclists will be required to dismount and walk through portions of the proposed detour routes.

Figure 2.9: Pedestrian Detour Map

2.9 Visual Resources

2.9.1 Methodology

Assessment of the visual resources in the area of the Mill Creek Ravine Trestle Bridge accounted for the aesthetics of the bridge, its context in the Mill Creek Ravine area and anthropogenic use. Existing viewscapes and sightlines were documented by the ISL field biologists through a qualitative description of views observed on and surrounding the bridge.

2.9.2 Results

The Mill Creek Ravine is a deep, un-manicured natural ravine in the middle of numerous residential neighborhoods. The thick canopy of the forest provides seclusion and noise buffering from the City. The Trestle Bridge provides an excellent viewpoint of Mill Creek, particularly during the fall months, providing a visual focal point and, for some, a destination within the Ravine. Sightlines downstream are not as limited as most places within the ravine and provide a great view of the dense vegetation present, tree canopy and the winding and topographically varying nature of the trail system. In previous studies, these aspects were noted to be appreciated by the public as relayed to the biologists during their field assessments.

Structural deterioration of the bridge is visually evident to users. This concerns users of the bridge and to those who appreciate the Historic value of the bridge. Bank erosion is also visually evident and impacts the aesthetic value of Mill Creek through this reach.

The Historic appreciation of the Mill Creek Trestle Bridge is recognized as having significant value to visitors and residents. As noted in Section 1.4.1, the Bridge was designated as a Municipal Historic Resource under Bylaw 13472 in 2004 (City of Edmonton 2004). The Bylaw emphasizes the value of the visual resource wherein under the General Guidelines it states: "*The original distinctive qualities and character of the Historic Resource shall not be destroyed…Distinctive stylistic features and examples of skilled craftsmanship of the Historic Resource shall be preserved and treated sensitively.*"

3.0
The Project

3.1 Project Rationale and Alternatives

As detailed fully in ISL's Preliminary Design Report (ISL 2023), as well as described in the previous studies on the Project Area (noted in Section 2.1.2), the Mill Creek Trestle Bridge and culvert are in need of restoration or replacement, in particular the Bridge substructure and culvert. Additionally, the adjacent banks of Mill Creek are heavily eroded and are undermining the bridge foundations.

3.1.1 Alternatives Considered

Alternative project designs including Bridge, culvert and bank stabilization designs are discussed fully in ISL's Preliminary Design Reports (ISL 2023, 2024). Alternatives are evaluated based on project cost, life cycle strategy, and preservation of Historical Value.

For both the trestle bridge replacement and the culvert replacement, several alternatives were carefully considered:

- **Do Nothing (Status Quo)**
  This option was ruled out early due to the deterioration of the infrastructure. Leaving the bridge and culvert in their current state would pose significant risks to safety, increase maintenance costs, and compromise access to critical routes over time.

- **Rehabilitation of Existing Structures**
  Rehabilitation was assessed as a potential middle ground. However, structural assessments revealed that extensive repairs would be cost-prohibitive and provide only temporary solutions without resolving foundational concerns. For the trestle bridge, the load-bearing capacity would remain suboptimal, while for the culvert, rehabilitation would fail to meet flow requirements and flooding risk.

- **Full Replacement with Modern Designs**
  This alternative emerged as the preferred solution after detailed analysis. It offered an opportunity to address structural deficiencies comprehensively, meet evolving engineering standards, improve durability, and exceed compliance with environmental guidelines.

3.2 Project Design

The selected design and rationale are discussed in the Preliminary Design Reports (ISL 2023, ISL 2024) and summarized below for consideration in this EIA. See the Design Drawings in Appendix I.

3.2.1 New Trestle Bridge

The replacement trestle bridge was chosen to reflect modern engineering standards while respecting the existing structure's historical aesthetic. The design integrates advanced materials and methods to enhance durability, safety, and environmental performance.

- **Structural Upgrades**:
  - The new bridge will feature cast-in-place concrete piles with a reinforced concrete pile cap, replacing the deteriorated substructure. This approach significantly improves the bridge's load-bearing capacity, ensuring it can safely accommodate pedestrian traffic and maintenance vehicles.
  - A new timber main span truss will replicate the appearance of the existing structure while incorporating modern steel connections for improved strength and reduced maintenance requirements. The timber components will use pressure-treated materials, which enhance resistance to weathering and pests. The new truss will also increase the span length over the creek, giving a greater cross-sectional area.
  - The design accounts for redundancies to ensure structural resilience, extending the bridge's service life well beyond the current limitations.

- **Environmental Sensitivity:**
  - The new design reduces the risk of scour and foundation erosion by improving hydraulic performance and stabilizing the adjacent streambanks.
  - Construction methods will minimize disturbances to Mill Creek and its surroundings. Strategies include installing concrete foundations outside the active watercourse and using temporary isolation measures (e.g., cofferdams) to protect aquatic habitats during construction.
  - The design preserves the historical character of the original timber trestle bridge while using sustainable materials and techniques.

- **User Experience:**
  - The new bridge will feature modernized safety elements, such as timber guardrails reinforced with steel for enhanced strength and protection.
  - Decking will incorporate non-slip surfaces to ensure pedestrian safety, particularly in adverse weather conditions.
  - The aesthetic design remains historically consistent, maintaining a visual connection to the original structure while providing a safer and more reliable crossing.

3.2.2 Culvert Replacement

The replacement of the existing culvert with a single-span bridge and creek realignment was selected to resolve hydraulic and ecological deficiencies comprehensively. This design ensures improved water flow, wildlife connectivity, and long-term structural stability.

- **Hydraulic Efficiency:**
  - Replacing the failing culvert with a single-span open bridge eliminates flow constrictions, allowing for improved hydraulic performance. This significantly reduces the risk of flooding during high-flow events and mitigates sediment buildup, which was a persistent issue with the existing culvert.
  - By removing barriers to flow, the new design enhances the stream's natural dynamics, supporting long-term channel stability and reducing scour potential at the inlet and outlet.

- **Ecological Considerations:**
  - The open-span design restores the natural streambed, improving conditions for fish passage and wildlife movement. This aligns with current ecological best practices and provincial requirements for fish habitat protection.
  - Creek realignment will incorporate natural channel design principles, including the use of rock riffles, vegetation, and erosion-resistant features to stabilize the banks while supporting aquatic and riparian ecosystems.
  - Disturbances during construction will be offset through habitat restoration, such as replanting native vegetation and enhancing adjacent wildlife corridors.
  - The design reduces future ecological impacts by addressing the root causes of scour and bank erosion.
  - The project aligns with the City's environmental goals, such as improved ecosystem health and reduced infrastructure footprint, by eliminating the confined flow conditions caused by the culvert.

3.2.3 Bank Stabilization

To mitigate the erosion on the east bank immediately downstream of the bridge, an integrated vegetation-based and structural-based bioengineering approach is recommended (engineered vegetated slopes). This includes a combination of hard armoring along the toe of the slope (e.g., riprap) while completing a thorough planting program above the typical flood elevation

4.0
Project Impacts and Mitigation Measures

4.1 Impact Assessment

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. The potential Project VECs were identified based on those resources identified within the Terms of Reference (TOR) for the Project which were established in consultation with the City of Edmonton, see Table 4.1. 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 4.1: VECs and Potential Positive and Negative Effects

VEC	Anticipated Positive Effect	Potential Negative Effect
Surface Water and Hydrotechnical	• Stabilization of creek bed and bank erosion due to culvert inlet and outlet protection and bank rehabilitation • Reduced sedimentation of Mill Creek during high flow events • Increased hydraulic capacity of new bridge structure	• Alteration of surface hydrology of Mill Creek (e.g., increased erosion potential) • Alteration of drainage patterns • Erosion and sedimentation into Mill Creek during construction
Geotechnical and Soils	• Mitigation of slope failure	• Alteration of banks as a result of earthworks to achieve engineering requirements • Slope failure during construction • Admixing of soils • Interaction with contaminated soils
Vegetation	• Enhanced vegetation establishment on previously eroded banks with incorporation of engineered vegetated slopes	• Loss of native plant species and communities • Introduction of new weed or invasive species • Further establishment of existing weed or invasive species
Wildlife and Wildlife Habitat	• Enhanced wildlife habitat and increased potential nesting on engineered vegetated slopes • Enhanced access and passage between creek and upper bank due to engineered vegetated slopes • Improved wildlife passage under new bridge as compared to existing culvert structure	• Direct mortality of wildlife during construction • Disturbance to breeding or overwintering wildlife • Disturbance of nests, den or hibernacula
Fish and Fish Habitat	• Stabilization of eroding creek bed and banks reducing sedimentation during high flow events • Enhanced overhead cover due to engineered vegetated slopes • Improved fish passage under new 76 Ave bridge due to increased light and hydraulic capacity • Increase in fish habitat area and quality when replacing existing culvert with new 76 Ave bridge	• Direct mortality of fish • Alteration of riparian habitat • Sedimentation of the watercourse during construction • Alteration of instream fish habitat
Historic Resources	• Stabilizing meandering creek bed and banks may preserve potential historical or archaeological sites	• Incidental impact on previously unknown historical archaeological or paleontological resources during construction activities
Recreational Resources	• Structural integrity of the bridge is deteriorating. Bridge replacement will maintain recreation usage of the trail at the crossing • Recreational trail is at risk of being undermined if bank erosion continues. Bank stabilization will maintain the trail for future use	• Loss of access during construction
Visual Resources	• Engineered vegetated slopes and stabilization of bed and banks can improve aesthetic value • Bridge replacement will eliminate the visual impact and concerns users have regarding bridge structural deterioration	• Loss of aesthetic value (historic bridge aesthetic and vegetation changes) by visitors/recreational users • Loss or change of vegetation aesthetic value as viewed by passing motorists or visitors/recreational users

4.2 Potential Negative Effects and Mitigation

The analysis of the Project includes consideration of relevant mitigation measures. 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.

Potential Project negative effects as well as standard and site-specific mitigation has been described in Table 4.2. Mitigation measures must be revisited at the construction tendering phase to ensure they will be effective for the construction activities ultimately selected. Standard mitigation practices addressing potential effects of each VEC are outlined below.

4.2.1 Surface Water and Hydrotechnical

Effects

Potential negative effects on the Surface Water VEC associated with the Project include:

- Alteration of surface hydrology of Mill Creek.
- Alteration of drainage patterns in the Project Area.
- Erosion and sedimentation into Mill Creek during construction.

Mitigation

Application of appropriate mitigation measures will reduce the potential effects of the Project on Surface Water and Hydrotechnical. Key mitigation measures include:

- Including flow-mitigating design within the new channel to reduce downstream flows. Provide adequate erosion protection along the new channel.
- Maintain drainage patterns through the site through design and attempt to design to retain entire seasonal and semi-permanent stream lengths.
- 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 (CPESC) on a frequent basis.
- Monitor revegetation of the creek banks and side slopes to ensure that adequate vegetation is in place to deter sedimentation of Mill Creek.
- Preferentially conduct construction when no creek flooding is anticipated or there are planned water releases upstream by EPCOR. The Contractor shall be required to adequately protect the worksite from flood events utilizing appropriate isolation techniques.

4.2.2 Geotechnical and Soils

Geotechnical negative effects and mitigation measures relating to the pile types, depths and compression are not considered in the EIA as they are covered in Thurber's Geotechnical Report. Environmental effects and key mitigation are provided below.

Effects

Potential negative effects on the Geotechnical VEC associated with the Project that may impact the environment include:

- Alteration of banks as a result of earthworks to achieve engineering requirements
- Slope failure during construction
- Admixing of soils
- Interaction with contaminated soils

Mitigation

Application of appropriate mitigation measures will reduce the potential effects of the Project on the Geotechnical VEC. Key mitigation measures include:

- Stabilize creek banks by incorporating engineered vegetated slopes into design
- Geotechnical mitigation shall be incorporated into the construction plans
- Monitoring and maintenance of slopes shall be carried out on a regular basis
- Any fill materials or stained soils excavated during the project should be segregated and tested to determine appropriate disposal options.

4.2.3 Vegetation

Effects

The potential effects on Vegetation include vegetation removal for the new bridge, vegetation removal where required for temporary access across the creek as well as grading impacts, and are anticipated to be the following:

- Loss of native plant species and communities
- Introduction of new weed or invasive species
- Further establishment of existing weed or invasive species

Mitigation

Numerous potential effects on vegetation have been minimized through design, including utilizing the existing bridge footprint to the extent feasible, as well as limiting the clearing of trees to the extent required for the new bridge. Furthermore, application of appropriate mitigation measures will reduce the potential effects of the Project on vegetation. Key mitigation measures include:

- Design and implementation of a Tree Protection Plan for the Project: Tree removal will be limited to the extent feasible in the temporary workspaces around Mill Creek Trestle bridge. A separate Tree Protection Plan is being developed by ISL in consultation with the City to provide a clearer understanding of the tree removals required.
- Plan for temporary workspace and laydowns outside of the Mill Creek Ravine to avoid significant tree removal
- Weed control prior, during, and following construction, as well as equipment cleaning and soil handling procedures to minimize weed spread, is recommended
- Conduct during and post-construction monitoring of weed growth and conduct weed control if necessary. Implement a multi-year weed control and monitoring program.

4.2.4 Wildlife and Wildlife Habitat

Effects

Potential effects on Wildlife and Wildlife Habitat associated with the Project are focused mostly on disturbance of wildlife species and habitat during construction and include:

- Direct mortality of wildlife during construction.
- Disturbance to breeding or overwintering wildlife.
- Disturbance of nests, den or hibernacula.

Mitigation

Application of appropriate mitigation measures will reduce the potential effects of the Project on wildlife and wildlife habitat. Key mitigation measures include:

- Avoid disturbance of natural habitats by minimizing work footprint.
- Outside the nesting period, a wildlife sweep should be completed by a qualified wildlife specialist as a due diligence measure to avoid destruction of an active nest (utilized within the previous 3 years) or den, hibernacula or wildlife.
- If construction takes place during the nesting period (February 1 to August 31), a nest sweep must be conducted, with an additional sweep scheduled no more than 7 days before construction begins to prevent incidental take. Furthermore, activities within the nesting period must not be paused for more than 4 days, or a new sweep will need to be conducted.
- In the event that migratory birds or their nests are identified during the nest sweep, or species of regulatory concern or dens or hibernacula are encountered, a setback may be identified through consultation with ECCC where feasible.

4.2.5 Fish and Fish Habitat

Effects

Potential negative effects on Fish and Fish Habitat associated with the Project are focused mostly on instream work, such as the implementation of riprap, erosion mats and replacement of gabion baskets around culvert inlet and outlet, rehabilitation of the scour pool and installation of the bioengineered slopes.

- Direct mortality of fish
- Alteration of riparian habitat
- Alteration of instream fish habitat
- Sedimentation of the watercourse during construction

Mitigation

Application of appropriate mitigation measures will reduce the potential effects of the Project on fish and fish habitat. Key mitigation measures include:

- Work within the watercourse should be conducted in low-water season as much as possible, and any instream work should be completed in isolated conditions.
- Install isolation methods and conduct a fish rescue prior to any in-water works taking place.
- Direct the grading away from Mill Creek to the extent possible, to reduce the risk of sedimentation.
- Limit riparian and instream work to the extent required.
- Use dams made of non-earthen material such as water-inflated portable dams, concrete blocks, sandbags, clean rock, or other appropriate designs to separate the work site from flowing water
- Implement, inspect and repair ESC measures to prevent sedimentation of Mill Creek. Monitor to assess sediment release (i.e.., turbidity and Total Suspended Solids [TSS]) during construction

4.2.6 Historical Resources

Effects

The potential effects on Historical Resources are focused on chance-find encounters that may impact historical resources. A Historical Resources Impact Assessment is being completed to limit any direct impact on resources.

Mitigation

Application of appropriate mitigation measures will reduce the potential effects of the Project on recreational resources. Key mitigation measures include:

- The Contractor will develop a Chance-Find procedure for the incidental find of historical resources during construction.
- Paleontology monitoring will occur if excavations that reach bedrock occur (see below).
- An archaeological HRIA will occur prior to construction; additional mitigation measures may be required based on findings and clearance.

It was recommended as part of the preliminary Historical Resources investigation that a HRIA be completed prior to construction. Further mitigation measures and monitoring may be required to limit impacts to Historical Resources.

4.2.7 Recreational Resources

Effects

The potential effect on Recreational Resources is limited to trail closures and detours during construction.

Mitigation

Application of appropriate mitigation measures will reduce the potential effects of the Project on recreational resources. Key mitigation measures include:

- Minimizing construction time and trail closures to the extent possible
- Providing signage at all trail entries at the top of the ravine, notifying the public of closures and providing detour options well in advance. Signage should be used in areas to educate the public about the type and duration of work occurring within the ravine. If trails will have detour routes, directional signage should be provided and should aim to be accessible for all. If the trail will be closed, public signage should clearly indicate the location of the impacted area and the duration of closure.
- Open excavations should have temporary fencing with gaps no bigger than 10 cm to prevent any off-leash dogs from accessing
- Construction and maintenance activities that involve heavy vehicles and machinery should take greater care entering off-leash areas where there is increased pedestrian and pet traffic
-

4.2.8 Visual Resources

Effects

The potential effects on Visual Resources are anticipated to be the following:

- Loss of historical aesthetic value.
- Loss or change of vegetation aesthetic value.

Mitigation

Design of the new bridge has been completed to complement the natural environment and be similar to the existing structure, except for the underlying culvert. Additional application of appropriate mitigation measures will reduce the potential effects of the Project on recreational resources. Key mitigation measures include:

- Narrow construction limits to the minimum required for construction
- Plant and seed with native species known to be present in the Mill Creek Ravine
- Design and implement a Tree Protection Plan.
- Enhance aesthetic value of the eroded creek bank by incorporating engineered vegetated slope.

Table 4.2: Standard and Site-Specific Mitigation for Potential Negative Effects

Environmental Component	Potential Negative Effect	Location	Standard Mitigation	Site Specific Mitigation	Potential Residual Negative Effect
Surface Water and Hydrotechnical	Alteration of surface hydrology of Mill 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). • Implement an erosion and sediment control plan and a Spill Response Plan.	• Armour bed and banks of Mill Creek near bridge footings with riprap, remove failing gabion baskets and repair scour hole and bank erosion to reverse hydrotechnical impacts.	**Alteration of surface hydrology of Mill Creek**
	Alteration of drainage patterns	Project Footprint		• Maintain drainage patterns through the site through design and attempt to design to retain entire seasonal and semi-permanent stream lengths	No residual effect identified
	Erosion and sedimentation into Mill Creek during construction	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 creek banks and side-slopes to ensure that adequate vegetation is in place to deter sedimentation of Mill 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
Geotechnical and Soils	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.The Contractor is required to develop a spill response plan, If a spill or release into the environment occurs, the contractor is responsible for controlling and cleaning it up, and if needed, remediating the affected area. The contractor must ensure an acceptable level of clean-up in consultation with the City of Edmonton and relevant regulatory agencies. • Report any suspected contamination discovery, even if no caused by the contractor, to the City of Edmonton's project representative and the City of Edmonton's spill reporting hotline at 780-496-6666. • Spill kits shall be made available in all equipment and at any laydown areas. • Spill trays with the same or greater holding capacity as the equipment shall be placed under all fuel tanks, jerry cans, generators, light tower trailers, and fueled equipment (when not in use). • Refueling shall be completed over spill trays. • All fueling and storage of hazardous material should take place at a distance greater than 100 m from any waterbody unless a site-specific mitigation plan (e.g., secondary storage) is developed to allow for that to occur.	• Limit impacts to landscape by limiting footprint of project to extent feasible. • Stabilize creek banks by incorporating engineered vegetated slopes into design.	No residual effect identified
	Slope failure during construction	Project Footprint		• Conduct work from trail at top of bank where possible. • Follow mitigation recommendations in the Geotechnical report for slope stabilization work. • Monitoring and maintenance of slopes shall be carried out on a regular basis.	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
	Interaction with contaminated soils	Project Footprint		• Limit impacts to landscape by limiting footprint of project to extent feasible. • Any fill materials or stained soils excavated during the project should be segregated and tested to determine appropriate disposal options. • All imported fill material must be approved by the City of Edmonton's project representative.	No residual effect identified
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 removal is required to accommodate it. • 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.	• Fence boundaries to avoid disturbance of Mill Creek. Do not allow clearing or grading beyond the fencing unless mitigation plans and approvals for that area have been made/obtained from the Engineer. Re-fence the boundaries where warranted following disturbance. The fence stall be tacked to the ground such that off leash dogs cannot enter. • Design and implementation of a Tree Protection Preservation Plan for the Project: Tree removal will be limited to the extent feasible in the temporary workspaces around Mill Creek Trestle bridge. A separate Tree Protection Plan is being developed by ISL in consultation with the City to provide a clearer understanding of the tree removals required. Include large trees within the restoration plan for the banks of Mill Creek.	**Loss of native plant species and communities**

Environmental Component	Potential Negative Effect	Location	Standard Mitigation	Site Specific Mitigation	Potential Residual Negative Effect
	Introduction of new weed or invasive species	Project Footprint	• 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, Mill Creek) • Clear vegetation only to the extent warranted to reduce the loss of native vegetation and reduce the potential for terrain instability and erosion. • 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.	• 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 weed 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. • Utilize a certified and licensed pesticide applicator company to conduct any chemical control of weeds. • If Noxious or Prohibited 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.	**Introduction or further establishment of weed or invasive species**.
	Further establishment of existing weed or invasive species	Project Footprint			
Wildlife and Wildlife Habitat	Direct mortality of wildlife during construction	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. • Where lengths of silt fence are longer than 30m, install gaps where feasible, to facilitate small animal movement.	• Outside the nesting period, a wildlife and nest sweep should be completed by a qualified wildlife specialist as a due diligence measure to avoid destruction of an active nest (utilized within the previous 3 years) or den, hibernacula or wildlife. • During the nesting period, an additional nest sweep should be completed 7 days or fewer prior to construction to prevent incidental take. Further, activities occurring within the nesting period must not be stopped on site any longer than 4 days or another sweep must be conducted. • In the event that migratory birds or their nests are identified during the nest sweep, or species of regulatory concern or dens or hibernacula are encountered, a setback may be identified through consultation with ECCC where feasible.	No residual effect identified
	Disturbance to breeding or overwintering wildlife	Project Footprint			
	Disturbance to nests, den or hibernacula	Project Footprint			
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 Mill Creek. Control wastewater from construction activities to ensure it does not enter Mill Creek. • Prohibit fuel storage, refueling, or servicing of equipment within 30 m of any waterbodies (i.e., Mill 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., Mill 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 Mill 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.	• Work within the watercourse should be conducted in low-water season as much as possible, and any instream work should be completed in isolated conditions. This includes the demolition and removal of the existing abutments and trestles. • Implement 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 riparian 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 Mill Creek where possible.	No residual effect identified
	Alteration of instream fish habitat	Project Footprint		• Limit impacts to instream fish habitat by limiting instream footprint to the extent required. • Include fish habitat features within the new channel alignment, including riffles and pools. • Ensure a 'low-flow' channel is incorporated into the design to allow for fish habitat to be present during drought conditions.	**Alteration of instream fish habitat**
	Sedimentation of the watercourse during construction	Project Footprint		• 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.	**Increase of suspended sediment during in-water construction**

Environmental Component	Potential Negative Effect	Location	Standard Mitigation	Site Specific Mitigation	Potential Residual Negative Effect
			• 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. • Develop and implement a response plan to avoid a spill of deleterious substances into water.	• 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. •	
Historic Resources	Incidental impacts to previously unknown historical archaeological or paleontological resources during construction activities	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 Historic Resources Management Branch of the Ministry of Arts, Culture and the Status of Women.	• Paleontology monitoring will occur where required by Alberta ACSW during construction. • Complete and follow any requirements under the HRIA.	**Incidental impacts on previously unknown historical resources.**
Recreation Resources	Trail closures and detours	Local Study Area	• Minimize construction time and trail closures to the extent possible. • Provide and install ample signage at trail intersections, describing closures and alternate routes well ahead of construction. • Preferentially conduct bridge construction at lower recreational use times of the year.	• Providing signage at all trail entries at the top of the ravine, notifying the public of closures and providing detour options well in advance. Signage should be used in areas to educate the public about the type and duration of work occurring within the ravine. If trails will have detour routes, directional signage should be provided and should aim to be accessible for all. If the trail will be closed, public signage should clearly indicate the location of the impacted area and the duration of closure. • Open excavations should have temporary fencing with gaps no bigger than 10 cm to prevent any off-leash dogs from accessing • Construction and maintenance activities that involve heavy vehicles and machinery should take greater care entering off-leash areas where there is increased pedestrian and pet traffic	**Loss of access during construction**
Visual Resources	Loss of historical 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. • 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.	• Choose a bridge design and visual aesthetics congruent with Historical Aesthetic Value of the existing Mill Creek Pedestrian Bridge.	No residual effect identified
	Loss or change of vegetation aesthetic value as viewed by passing motorists or visitors/recreational users	Project Footprint		• Plant and seed with native species known to be present in the Mill Creek Ravine • Design and implement a Tree Protection Plan • Enhance aesthetic value of the eroded creek bank by incorporating engineered vegetated slope.	No residual effect identified

4.3 Residual Effects

4.3.1 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 4.3 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 4.3: Evaluation of the Residual Negative Effects of the Project

VEC	Potential Effect	Nature	Magnitude	Duration	Extent	Likelihood of Effect	Significance
Surface Drainage and Hydrotechnical	Alteration of surface hydrology	Direct	Moderate	Long Term	Restricted	Predictable	Non-significant
Geotechnical and Soils	No residual effect identified	n/a					
Vegetation	Loss of native plant species and communities.	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
Wildlife and Wildlife Habitat	No residual effect identified	n/a					
Fish and Fish Habitat	Alteration of instream fish habitat	Direct	Moderate	Long Term	Restricted	Predictable	Non-significant
	Increase of suspended sediment during in-water construction	Indirect	Low	Short Term	Local	Uncertain	Non-significant
Historic Resources	Incidental impacts on previously unknown historical resources.	Direct	Low	Permanent	Restricted	Predictable	Non-significant
Recreation Resources	Loss of access during construction	Direct	Low	Short Term	Local	Predictable	Non-significant
Visual Resources	No residual effect identified	n/a					

4.3.2 Residual Effect Evaluation

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

Alteration of Surface Hydrology of Mill Creek

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

- Nature: Direct – Alterations of Mill Creek flows are directly attributed to the Project.
- Magnitude: Moderate – The Project will affect the hydraulics of Mill Creek through the reach of the realignment.
- Duration: Long-Term – The Project will affect the hydraulics of Mill Creek, for the lifespan of the realignment.
- Extent: Restricted - The Project will affect the hydraulics of Mill Creek at the bridge location.
- Likelihood: Predictable – the hydraulics of Mill Creek were modeled and guided the design of the realigment, and therefore understood.

Significance Evaluation

As the impacts to hydraulics are modelled by hydraulic engineers and deemed to not be significant, the magnitude is considered moderate, the duration long-term and extent restricted, therefore the residual effect is considered not significant. Notably, the new channel will provide a much more natural hydraulic regime for Mill Creek and reduce both up and downstream flooding concerns throughout the Project area.

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) to facilitate construction
- Magnitude: Low – Vegetation removal will be limited to commonly available species, is limited in the amounts removed around the bridge and where access is deemed necessary
- Duration: Medium Term – Vegetation removed for temporary work area will 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 and will be included within the Tree Protection Plan being developed for the Project.

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 trees are relatively small and will equitably compensated for in accordance with the City of Edmonton Guidelines for Evaluation of Trees (City of Edmonton. 2020b).

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.
- 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 and therefore the residual effect is considered not significant.

Alteration of Instream Fish Habitat

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

- Nature: Direct – Alteration of fish habitat due to riprap placement and deep pool removal is a direct effect.
- Magnitude: Moderate – The Project will increase riprap around 76 Ave Bridge footings, however most of the crossings already have rip rap placed across the channel and will not significantly change the habitat values of the Project. The Project will rehabilitate the deep erosion scour pool downstream of the culvert outlet, removing this habitat type in the stretch.
- Duration: Long-term - The Project will affect the instream habitat for the lifespan of the bridge.
- Extent: Restricted -The Project will affect habitat at Mill Creek, at the culvert inlet and outlet and deep scour pond and bank rehabilitation areas.
- Likelihood: Predictable – Instream works will occur, as they are part of the design for the Project.

Significance Evaluation
Fish habitat is considered of low value within Mill Creek due to the lack of connectivity to the North Saskatchewan River, and restrictions currently in place by the restrictive culvert. Replacement of the existing culvert with a bridge will improve fish passage and habitat area and quality generally. As the magnitude of the effect is low, and with implementation of appropriate mitigation measures 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 Mill 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.

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: Low – Important historical features would likely have been captured by the HRIA process.
- 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 extensive historical work has been completed for the Project to proactively locate historical features.

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

Loss of Access During Construction

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

- Nature: Indirect – Impacts to recreational users will be direct, as it will force users through detours.
- Magnitude: Moderate – Detours are considered substandard and may have some impacts on pedestrian and cyclists.
- 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 access is of a limited timespan that will only occur during construction, the Project will expand the lifespan of recreational access through the Ravine, so therefore is considered not significant.

4.4 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).

There are both positive and negative effects of the Project. Anticipated positive impacts include geotechnical and hydrotechnical stabilization of Mill Creek bed and banks, restoring structural integrity by replacing the bridge to maintain recreational use of the crossing, as well as culvert replacement to extend the lifespan of the Project. Negative effects include some loss of vegetation where access for construction is required, as well as alteration of fish habitat. Cumulatively, the environmental nature of Mill Creek has been relatively retained while the growth of Edmonton has occurred around it, with limited access and previous disturbance. This Project limits cumulative impacts on the environment by replacing the bridge and culvert and stabilizing the bed and bank erosion while maintaining the existing trail network, providing an increased lifespan in the ravine while limiting new direct impacts.

5.0 Environmental Monitoring

5.1 Monitoring Recommendations

The Contractor shall develop an ECO Plan as per the most up to date City of Edmonton's ECO Plan Framework (CoE 2020d). 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 Environmental Monitors assigned to this project will be considered Qualified Environmental Professionals with extensive experience in construction-related environmental management and regulatory compliance. They will hold appropriate professional designations such as Professional Biologist (P.Biol.), Professional Agrologist (P.Ag.), etc. Alternatively, individuals with equivalent qualifications and demonstrated competence in environmental monitoring, validated through prior experience, will be considered for monitoring duties. The monitors will have proven expertise in monitoring activities such as noise assessments, ESC measures, water quality evaluations, wildlife observations, and vegetation management. Their experience will also include preparing regulatory reports and implementing mitigation strategies in alignment with federal, provincial, and municipal regulations.

Recommended ECO Plan Monitoring:

The ECO Plan should incorporate the following monitoring activities in Table 5.1, below.

Table 5.1: Monitoring Activities

Monitoring Activity	Monitoring recommendations aimed at ensuring effectiveness of mitigation	Monitoring required for legal compliance
ESC measures	yes	yes
Weed monitoring during and post-construction with a multi-year control program.	yes	yes
Vegetation disturbance monitoring to prevent unnecessary impacts	yes	-
Vegetation monitoring post-construction until fully established	yes	-
Wildlife monitoring, pre-construction wildlife sweeps, and pre-disturbance nest sweeps, as per Section 2.5.	yes	yes
Wildlife Monitoring: Conduct wildlife sweeps and monitor any identified raptor nests or significant wildlife features (e.g., wildlife trees, confirmed denning areas) discovered during the Project or through monitoring programs,	yes	yes
Turbidity monitoring, particularly during instream works or runoff events	yes	yes
Isolation monitoring	yes	yes
Fish salvage and rescue monitoring	yes	yes
Paleontological monitoring if excavations reach bedrock or as required under the HRIA	yes	yes

Monitoring and Reporting Frequency (Including Shutdown Periods):

Monitoring will occur regularly throughout all project phases, including during shutdown periods. Specific frequencies are as follows:

- Daily: During active construction for key activities such as erosion control inspections and wildlife observations.
- Weekly: Routine environmental site assessments and reporting on ESC measures.
- Monthly: Summary reports consolidating daily and weekly observations.
- During Shutdowns: Monthly inspections to ensure ESC measures remain functional and to address any environmental concerns such as erosion or sedimentation.
- Event-Triggered Monitoring: Additional inspections following significant rainfall events, spills, or other environmental incidents. All monitoring activities will be documented in compliance reports submitted to the City of Edmonton at the agreed intervals.

Consultant's Environmental Oversight Role During Construction:

The Consultant will provide third-party environmental oversight to ensure compliance with regulatory requirements and the ECO Plan. Specific oversight activities include:

- Conducting regular environmental audits and inspections.
- Reviewing and verifying the Contractor's monitoring reports.
- Providing technical guidance and recommendations on mitigation measures.
- Reporting non-compliance issues and advising on corrective actions.
- Acting as a liaison between the Contractor and regulatory agencies.
- Submitting independent monthly environmental compliance reports to the City of Edmonton.

Post-Construction Environmental Obligations and Monitoring:

Post-construction monitoring will be implemented to ensure successful site restoration and compliance with regulatory conditions. Obligations include:

- Vegetation Monitoring: Annual surveys to assess revegetation success until vegetation is fully established).
- Weed Control Monitoring: Ongoing inspections and treatments for invasive species.
- Edmonton and other relevant regulatory agencies.
- Final Compliance Review: A comprehensive environmental closure report upon completion of all monitoring obligations.

Contingency Plans if an Impact is Detected or Thresholds Are Not Met:

Contingency plans will be specific to the VEC threshold or impact detected. Plans include but are not limited to:

- Turbidity thresholds exceeded: stop work and follow the plans described in the turbidity monitoring specification of the Tender, repair controls or other causal source of turbidity.
- Death of fish: stop work and engage the Contractors fisheries biologist to determine next steps, including reporting to appropriate agencies (DF)
- Wildlife nest observed: stop work and engage a wildlife biologist to determine next steps, including setbacks, delays, etc.
- Spills of deleterious substances: follow the ECO plan, Erosion and Sediment Control Plan, Spill Response Plan, MSDS, direction of AEPA or other procedures and methods to adequately address the impact as soon as possible after detection.
- The awarded contractor shall consult the construction tender for thresholds and contingency requirements for vegetation and weed control.

6.0
Public Consultation

6.1 Stakeholder Engagement Summary

The purpose of stakeholder engagement for the Project was to share project information and gather feedback and answer questions on environmental concerns, proposed detour plans and construction plans.

Two stages of engagement were hosted for the project, the first held in January 2023 towards the end of the Preliminary Design phase of the project, and the second in November and December of 2024 when more details were available. The engagement approach included stakeholder meetings and email correspondence.

For this phase of engagement, the stakeholders were engaged at the ADVISE level of engagement on the City of Edmonton's Public Engagement Spectrum, as shown below.

6.1.1 Who We Engaged

- Surrounding Community Leagues
- Paths for People
- Edmonton River Valley Conservation Coalition
- North Saskatchewan River Valley Conservation Society

6.1.2 What We Presented

The Project Team shared a presentation that included:

- overview of the project
- history of the bridge and current condition
- proposed new structure
- bank stabilization
- culvert replacement
- environmental assessments
- construction plans with pedestrian detours

6.1.3 What We Heard:

Environmental

- Interest in plans for mitigating scour and ensuring consistent flows during droughts and floods, including fish-friendly features.
- Appreciation and support for daylighting Mill Creek and the positive environmental impacts this will have for the Mill Creek Ravine.
- Concerns about the amount and locations of tree and brush removals, with suggestions to clearly communicate long-term habitat and replanting benefits to the community.
- Concerns about the protection and maintenance of newly planted vegetation, with recommendations for a detailed watering plan and success measures for vegetation establishment.

Detour and Construction Timelines

- Suggestions to improve trail conditions on detour routes, such as re-graveling certain areas.
- Suggestions for clear signage during construction at accessible access points and key intersections in the Mill Creek trail system to reduce confusion and backtracking for people using the trails.
- Questions about the length of trail closures, with suggestions to open trails before the project's completion where possible.
- Concerns about the accessibility of detour routes for people of all ages and abilities.
- Concerns about the length of construction timelines and the impacts to surrounding roads, such as 89 Street and 96 Street, which may see increased traffic due to the road closure.

  Concerns about the impacts to businesses in the area, specifically in the Ritchie area.

76 Avenue

- Suggestions about permanently closing 76 Avenue to vehicle traffic and maintaining an active transportation route over Mill Creek.
- Concerns about the condition of 76 Avenue and coordinating the culvert replacement portion of the project with the upcoming 76 Avenue Renewal project.
- Interest in joint communications to coordinate updates for the projects in the area, the Mill Creek Pedestrian Bridge and Culvert Replacement Project and the 76 Avenue Renewal Project.

Other

- Interest in the bridge design maintaining its historic aesthetic while incorporating modern durability.
- Questions about the treatment process of the wood for the new structure and reusing or salvaging materials where possible from the existing bridge.
- Recommendations for adding amenities including resting spots, benches, lighting, and potentially bat habitats under the bridge.

6.1.4 Next Steps

The Project Team will host a pre-construction information session before construction starts in late 2025. Participants will see the confirmed detour plans and construction staging areas and will be invited to ask the Project Team questions. Regular updates will also be shared on the project webpage, including construction timelines and environmental considerations.

6.1.5 GBA+ Considerations

ISL applied a GBA+ lens to the engagement activities to create an inclusive and accessible process. While regulatory constraints such as the Municipal Historic Resource Bylaw and River Valley Bylaw limit the scope for public input on the structure's design, GBA+ principles were integrated into areas where community feedback could have a meaningful impact. These areas include construction detours and environmental mitigation measures.

Stakeholder meetings were held during the preliminary design phase with groups such as nearby community leagues, Paths for People, Edmonton River Valley Conservation Coalition and North Saskatchewan River Valley Conservation Society. For engagement, GBA+ considerations included hosting online and in-person meetings that best suited the participants needs. Presentations and images used plain language to ensure accessibility and avoided technical jargon and acronyms to accommodate a wide range of stakeholder's knowledge and understanding for the project, the process and the area. The technical team presented project details, answered questions, and gathered feedback.

GBA+ considerations for construction were identified by the project team and confirmed with participants in stakeholder engagement include the accessibility of the detour routes. The key consideration raised was ensuring detour routes during construction are accessible to users of all ages and abilities, reflecting the project's commitment to inclusive design for the project and during construction. Stakeholder input will continue to inform decisions on construction impacts and accessibility planning.

7.0 Conclusions

7.1 Regulatory Summary

See Appendix B, 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

7.2 Impacts Summary

See Table 4.1 for a complete list of anticipated positive and negative impacts, as well as Table 4.2 for a discussion of potential negative residual impacts of the Project on VEC's.

7.2.1 Positive Impacts

Positive impacts of the Project on VEC's include:

Surface Water and Hydrotechnical: Creek realignment and daylighting and bank rehabilitation will stabilize erosion of the creek bed and bank. Sedimentation of Mill Creek during high flow events will be reduced.

Geotechnical: Slope failure of Mill Creek banks downstream of the culvert will be mitigated.

Vegetation: Incorporation of engineered vegetated slopes on existing eroded bank of Mill Creek will enhance vegetation establishment.

Wildlife and Wildlife Habitat: Enhanced vegetation establishment on the eroded creek bank will increase potential wildlife habitat and wildlife access between creek and upper bank. Improved wildlife passage under the new 76 Avenue bridge will increase safety for medium-large sized wildlife utilizing the crossing under the bridge.

Fish and Fish Habitat: Stabilization of eroding creek bed and banks will reduce sedimentation of Mill Creek during high flow events. Improvement in fish passage under the new 76 Avenue bridge and improved shade instream due to enhanced overhead on engineered vegetated slope.

Recreation: Although impacted in the short term through trail detours during construction, the new bridge will extend the lifespan of the crossing leading and preserve the trail system on the downstream upper bank of Mill Creek for recreational users.

Visual Resources: Structural deterioration of the bridge and creek bank erosion is evident to users. Bridge replacement will eliminate the visual impact and concerns users have regarding bridge structural deterioration. Similarly, the erosion of the downstream right bank of Mill Creek in the Project area impacts the visual aesthetic of the Creek. Rehabilitation utilizing engineered vegetated slope design will improve the aesthetic.

7.2.2 Negative Impacts

Potential residual negative impacts of the Project on VEC's following implementation of mitigation measures includes the following:

Vegetation: Due to clearing or grading activities, there will be a short-term loss of existing native plants. As with any earthworks project, there is a risk of introduction or further establishment of weed or invasive species.

Fish and Fish Habitat: Due to infilling the large scour pool as part of the instream rehabilitation, there will be some alteration of instream fish habitat including loss of deep pool habitat type.

Historical: There may be an incidental impact on previously unknown historical archaeological or paleontological resources during construction activities.

Recreational: Construction activities will necessitate the closure of the bridge and immediate trail area. This will result in a loss of recreational value during construction, however is of low .

7.2.3 Cumulative Effects

This Project limits cumulative impacts on the environment by replacing the bridge and culvert and stabilizing the bed and bank erosion while maintaining the existing trail network, providing an increased lifespan in the ravine while limiting new direct impacts. As no residual effects are considered significant, it is recommended that cumulative impacts be deemed non-significant.

7.3 Closing

The Mill Creek Trestle Bridge Replacement Project offers an opportunity to address historical environmental degradation while balancing the demands of urban development during the necessary replacement of the Mill Creek Trestle bridge. The Project not only mitigates its own environmental impacts with the daylighting of the creek, but also enhances the broader ecological, cultural, and social context of the Mill Creek Ravine for future generations.

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Appendix A

Terms of Reference

North Saskatchewan River Valley Area Redevelopment Plan

A Guide to Completing Environmental Impact Assessments

Table of Contents

Introduction

The North Saskatchewan River Valley Area Redevelopment Plan, Bylaw 7188, protects, preserves, and enhances the North Saskatchewan River Valley and Ravine System as Edmonton's greatest asset and mitigates the impacts of development upon the natural functions and character of the river valley and ravine system.

The following guide has been developed to outline the process and content required for completing environmental impact assessments under Section 3.3.3 of the North Saskatchewan River Valley Area Redevelopment Plan (Bylaw 7188). The aim is to provide a consistent approach to assessing impacts, to increase efficiency in report preparation and review, and to improve communication between the agencies and individuals involved.

This Guide is general in nature applying to a range of projects including park master plans, park and facility development projects and utility and infrastructure projects. Proponents are advised that under Section 3.5.3 of the the North Saskatchewan River Valley Area Redevelopment Plan a site location study in addition to an environmental impact assessment that details costs, and social, environmental and institutional constraints which make a River Valley location essential must be prepared for City Council approval. The terms of reference and reporting requirements for the Site Location Study are included as Appendix A (Guide to undertaking a Site Location Study). The environmental impact assessment and site location study should be undertaken prior to Council committing funds for capital expenditure related to any project.

Project Specific Notes:

- **This project requires Administration and City Council approval**
- **A Site Location Study is not required**

Environmental Impact Assessment Guide

These guidelines provide a general framework in completing an environmental impact assessment in accordance with the requirements outlined in the North Saskatchewan River Valley Area Redevelopment Plan. Emphasis is placed on early consultation with the City of Edmonton and other review agencies (e.g. Province of Alberta). This helps to improve communication, identify issues and constraints at an early stage, avoid costly delays, and make efficient use of time and resources. On-going dialogue and reporting is expected throughout the process.

Prior to commencing work on the environmental impact screening assessment report a pre-consultation, scoping and project review with the Urban Growth and Open Space Section of Urban Planning and Economy is strongly advised to:

- Screen proposed projects to determine the type of environmental review required and
- Identify preliminary ecological constraints and other issues requiring assessment.

A pre-consultation meeting for an environmental impact screening assessment will include staff from the City's Urban Growth and Open Space section of the Urban Planning and Economy Department, other review agency staff where appropriate, and the applicant. If the applicant has already retained a consultant to complete the environmental report, then the consultant should be included in this meeting. The preliminary scope of the environmental report will depend on the following:

- The scale of the nature of the proposed development or site alteration;
- The character of the natural environment and its associated ecological functions;
- The site's setting within the landscape and/or watershed; and,
- The availability of previous studies and information.

Some specific study requirements for the environmental report, such as breeding bird surveys or field investigations of potential species at risk and their habitats, may be identified and agreed upon during pre-consultation, based upon the known natural features and ecological functions that could be affected by the proposed project.

Once the preliminary scope of the environmental impact assessment has been determined, the assessor (report writer) can proceed to gather information from available background sources and/or original field studies, confirm the scope of the report with the City, conduct the impact assessment and report on the study findings.

Specifications for field investigations are provided in Section Two. In general, however, applicants and their consultants should be aware that at least one site visit is required for every

environmental impact assessment report regardless of scope. An environmental impact assessment without direct, personal observations of the site will be considered incomplete. Site visit(s) will occur during the growing season rather than in the winter, when snow cover and normal seasonal dormancy severely limit potential observations. Multiple site visits may be required to provide an adequate understanding of the existing conditions at the site; in these cases, winter site visits may be acceptable for the purpose of investigating seasonal wildlife or locating certain nests more easily seen when the trees are bare of leaves.

The initial site visit for the environmental impact assessment should occur prior to any clearing of natural vegetation, or intrusive site investigations (e.g. installation of test wells or boreholes). If, during this initial site visit, any potential areas of constraints are identified where intrusive surveys could result in negative impacts on significant natural features or ecological functions, recommendations to avoid or minimise these impacts will be required.

Ongoing dialogue between applicants, their consultants and City staff is expected during the completion of the environmental impact assessment. Concerns or questions may be raised with staff at any time. Recommended points of contact with City staff include:

- Following the background information review and field study, to confirm the scope of the environmental impact assessment and discuss any environmental constraints identified; and,
- During the impact assessment, to discuss potential impacts, options for mitigation, and possible monitoring requirements.

In some cases, it may be beneficial to hold such discussions at the site, with other agency staff included where appropriate.

Once the environmental impact assessment report is complete it is submitted to the Urban Growth and Open Space Section of the City of Edmonton’s Urban Planning and Economy Department. Electronic submission (PDF) of reports is sufficient to facilitate the review process. Applicants should be aware that the environmental impact assessment report, along with other supporting materials, may be posted on the City’s website as part of the public consultation process.

Once the report is submitted, Urban Growth and Open Space will coordinate a review of the report and supporting information. A number of civic departments, as well as external agencies may be part of the review depending on the context and potential impacts of the proposed project. A minimum three weeks is required to complete the review and prepare comments to be forwarded to the proponent. Based on the results of the review, an environmental impact assessment may be accepted as written, or it may require revision to address comments and concerns raised by the reviewers or changes to the proposed project arising during the application review process. The resolution of comments or concerns may be achieved through discussions or meetings, or may in some cases require additional research or field

investigations, with subsequent revision to the report. Open, ongoing communications between the assessor and the City during the preparation of the environmental impact assessment should significantly reduce the likelihood of substantial revisions being required.

Section One: The Property

At the outset of the process, existing legislation, plans and studies should be reviewed as a means of understanding the legislative restrictions, land-use history, and ecological landscape of the area in question. Recent and historic air photos for the project area and its surrounding environment should be reviewed and included in the report.

Basic information on the property to be referenced in the environmental report include:

- Land ownership;
- Location of the property (municipal address and legal address);
- Current zoning;
- Description of existing and historic land uses and reference to current and historic air photos;
- Summary of federal, provincial and municipal regulatory requirements that apply to the project area.

In cases where a master plan project is being undertaken, or where a project encompasses multiple properties the Property Description will identify the entire project area.

In some cases a Phase I Environmental Site Assessment, or other applicable environmental assessment may be required. Requirements for Environmental Site Assessments are generally determined through pre-consultation prior to commencing work on the environmental report. If required, approval of the Environmental Site Assessment shall precede environmental approval as per the North Saskatchewan River Valley Area Redevelopment Plan (Bylaw 7188).

Section Two: Environmental Context

The description of the subject site and its environmental context provides the basis for the assessment of impacts to follow. This description should consider the lands adjacent to the site, not just the site itself. The level of detail required will vary based on the scale and complexity of the project. It is recognised that lack of access to adjacent lands may result in less detailed information. The environmental report should include an introductory overview that establishes the environmental setting for the proposed project relative to any known significant natural features on or adjacent to the site, followed by more detailed discussions of the various environmental components as outlined below. An environmental sensitivities map that clearly illustrates the key features associated with the site will be required to accompany the environmental report. The use of photographs to illustrate and accompany the environmental report is encouraged.

If the area in question has been assessed through a previous project/report please reference the project/report and include the relevant information as an appendix.

Depending on the location of the site, City staff may be able to provide background information and/or mapping resources.

2.1. Surface Water Management

Water features connect and contribute to the significance of natural system features and functions. While a detailed description of surface water, groundwater and fish habitat may not be required for all environmental reports, the following information must be identified:

- Runoff characteristics. Runoff characteristics are relevant to identify locations where the buildup of moisture could potentially cause concern over a long period of time;
- Depth of the water table. The depth of water table is an indicator of areas that are developable/undevelopable.

2.2. Geology/Geomorphology and Soils

While a brief description of the physical characteristics of the site is always relevant, detailed information on soils and geology may not be required for all environmental reports. The need for this information will be determined through pre-consultation meetings with staff from Urban Growth and Open Space and other city departments as required. For all projects the geomorphological boundary and relevant geomorphological

features must be included to highlight the location of steep slopes, floodplains, hills, ravine channels and any other relevant features.

The presence of modifying factors will influence the potential for slope movement and should be considered as part of project development. Modifying factors include:

- Presence of slope failure (active/inactive/recurrent);
- Evidence of river erosion;
- Potential for high water table;
- Previous mining activity;
- Presence of slip-off slope

Where modifying factors are present additional studies may be required in order to adequately inform the assessment of geotechnical risk, potential impacts from erosion, sedimentation and changes in local hydrogeology. Site-specific studies conducted in support of development proposals (e.g. hydrogeological and terrain analyses, geotechnical studies and/or slope stability analyses) should be referenced, when available.

Genetic Class of materials should be included in the site's description as it relates to soil classification. This description should include a brief description of soils on the site and surrounding area and shall include information on the following:

- Potential run-off: Involves the analysis of the slope and the infiltration capacity of the soil unit. Soil that has low or moderate-low runoff characteristics may pose a constraint.
- Erosion potential: Involves the analysis of the slope along with the infiltration capacity and erodibility rating of the soil unit.

If additional site-specific information is required, this background data should be supplemented with further soil characterization resulting from Ecological Land Classification field studies or other investigations (e.g. geotechnical studies). Where relevant, shallow and poorly drained soils should be indicated.

2.3. Vegetation

The report should include a description of the area’s vegetation, in order to assess habitat and biodiversity value, develop mitigation/management strategies, and strengthen the post-development ecological network. The need for specific field surveys may be identified during pre-consultation. The environmental report will include:

- Identification of vegetation community types present using classifications consistent with those in use by Alberta Environment and Sustainable Resource Development (e.g. Primary Land and Vegetation Inventory). If an alternative classification system is used to provide supplementary information, please reference and describe the system as required.
- Description of native plant diversity (e.g. number of species, evenness, etc.).
- List of rare or unique species or communities. This includes those species that are listed as:
    - Threatened or Endangered under the provincial Wildlife Act
    - Sensitive, May be At Risk under the General Status of Alberta Wild Species
    - S1, S2 or S3 by the Alberta Conservation Information Management System (ACIMS).

  Unique species are those that may not be listed as rare but are considered to be ecologically underrepresented in the Edmonton area.
- Description of the presence and distribution of invasive, non-native species or noxious/prohibited weed species.

2.4. Wildlife

As with vegetation cover, a thorough review of available background information on wildlife is expected as part of the environmental review. Incidental observations will be the minimum standard required for fieldwork. The need for specific field studies of taxonomic groups (e.g. breeding bird surveys, etc.) may be identified during pre-consultation. The environmental report will include:

- Lists of species observed, reported or expected to occur on or adjacent to the site, presented in tabular format (as an appendix) with notes on the species' relative abundance at the site, its residency status (i.e. is it present year-round, seasonally or only periodically; does it live on the property, forage there or use it as part of a movement corridor) and the evidence supporting its inclusion on the list (e.g., sighting, tracks previously reported);
- Description and mapping of any "wildlife trees" (i.e. tree with visible nests, or large trees with cavities) or other features that could provide nesting or den sites;
- An assessment of the site's suitability for any significant species (including species at risk - ANHIC, FWMIS, database research results on the potential presence of listed species at risk, species of special status or rare communities).

2.5. Historical Resources

The identification of historical/archeological sites within the River Valley and Ravine System does not indicate the existence of an environmental hazard. However, it does provide the location of potential areas to be preserved when future development/redevelopment is being proposed.

In accordance with Section 37(2) of the *Alberta Historical Resources Act*, the Minister of Alberta Culture and Tourism may require that any proposed activity that is likely to threaten the integrity of a historic resource be preceded by a Historic Resources Impact Assessment. In determining whether a Historic Resources Impact Assessment is required the proponent should submit a Historic Resources Application to Alberta Culture.

Historic Resource Impact Assessments and related mitigative strategies are paid for by the person or company (proponent) undertaking or proposing to undertake the project or activity. Professional private-sec

tor archaeologists, paleontologists, historians and traditional use consultants perform the required work.

For additional information visit the Historic Resource Impact Assessments website for the Government of Alberta.

2.6. Environmental Sensitivities Map

The environmental sensitivities map illustrating the areas environmental sensitivities and identified development constraints will support the descriptive overview for the subject site. The map will include a key map to show the subject site's location in relation to the surrounding major roads and other landmarks. The use of recent aerial photography as a base for the natural environment is strongly encouraged. The map will:

- Illustrate the property boundary or project area included in the scope of the assessment;
- Be drawn to scale, with standard mapping elements such as a scale bar, north arrow, date and legend;
- Identify 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 Sections 2.1 - 2.5 of this report;
- Identify all of the terrestrial and aquatic natural features, natural ecosystems and vegetation communities in the surrounding area that might be affected by the proposed development or site alteration;

- Include topographic information (i.e. elevation contours) at a level of detail sufficient to show general slope trends and specific topographic features.
- Outline potential development constraints and opportunities for protection, conservation, and restoration/stewardship in accordance with Best Practices as outlined in Table One and based on the City of Edmonton's Environmental Sensitivity Mapping database.

Section Three: The Project

In order to assess the environmental impacts of the proposed project on the identified natural features and functions on and adjacent to the site, a clear understanding of the project is required. Environmental sensitivities should be identified prior to beginning concept design, to the extent possible, to ensure the project is designed to avoid existing environmentally sensitive areas.

The project description must include information about all phases of the project, including site preparation, construction, landscaping and intended use of the property once the construction work is completed, and (in some cases) decommissioning, if this information is available. Any related off-site works by the proponent should also be included in the project description and impact assessment. This section of the report should also describe how any environmental constraints identified in Section 2 have been incorporated into the project. Consideration for project alternatives justifying why a location within the boundaries of the North Saskatchewan River Valley Area Redevelopment Plan shall be submitted as part of a Site Location Study (Appendix One).

The level of detail should reflect the size and complexity of the development or site alteration. The description must be accompanied by one or more graphic representations of the project.

3.1. Concept Plans and Drawings

The use of actual concept plans, development plans, site plans or other figures to illustrate and support the project description is required. At a minimum, the environmental report must include one or more plans showing the proposed development, park master plan or site alteration as an overlay applied to the environmental sensitivities map. The following information should be included in the plan(s), to the extent possible:

- Location of all existing and proposed lot lines, building envelopes and structures, fences, driveways, parking areas, roads, trails and pathways and any other park amenities;
- Services, including stormwater management facilities and drainage systems, public infrastructure and utilities;

Where vegetation impacts are anticipated including construction or project activity within five meters of a City-owned tree, a Tree Protection Plan shall be required. The Tree Protection Plan will outline how project work will be accomplished while protecting public trees. Urban Foresters with the City of Edmonton can provide assistance in drafting the necessary tree protection plans.

It is recognized that this level of detail will not be available nor appropriate for all projects and that additional information may still be in development. The results of the environmental review will (and should) inform and be incorporated into the final plans for the project.

Section Four: Project Impacts and Mitigation Measures

Once an understanding of both the existing environment and the proposed project has been established, the identification and assessment of impacts can begin. Assessing impacts and recommending appropriate mitigation measures is the most difficult and important task of the environmental impact assessment. In some cases Provincial and Federal approvals may be required in addition to City approval as part of Bylaw 7188. This section should also highlight any relevant Provincial and Federal approval requirements.

It is important to provide a clear assessment methodology that will lead to specific recommendations. Tools should be employed that will provide demonstrable rationale for recommending specific mitigation measures. Examples include but are not limited to matrix evaluation, checklist evaluation, ecological land classification and valued ecosystem components. Assessment methodology should include the following:

- Approach to the assessment;
- Scoping the assessment;
- Spatial and temporal extents;
- Assessment of effects;
- Determining the significance of effects; and
- Cumulative effects Assessment: A description of potential positive and negative environmental, social, economic and cultural impacts of the proposed activity, including cumulative, regional, temporal and spatial considerations.

4.1. Assessing Impacts

This section further describes the project, the associated impacts and related mitigation. Details on the interactions between the specific project components identified and elements of the environment where there is a potential to result in an impact (positive or negative) should be identified.

The proponent will classify the potential environmental effects into negative impacts and positive environmental effects, and characterise them using standard criteria such as:

- Nature of Impact: Is it direct, such as the loss of a feature, or indirect, such as an increase in downstream sedimentation?
- Magnitude: What is the severity of the impact, especially as compared with available benchmarks or targets?
- Geographic extent: How large an area will be affected?

- Duration and timing: Is the impact temporary or permanent? Is it seasonal?
- Likelihood: What is the probability that the impact will occur?
- Potential for cumulative impacts: What is the potential for interacting impacts as a result of previous or future development or site alteration?

4.2. Identifying Cumulative Impacts

Cumulative impacts are compound environmental effects that may result due to multiple or successive development or site alteration activities (e.g. implementation of a park master plan which includes multiple elements). Cumulative impacts may affect natural features or their ecological functions, water quality or quantity, sensitive surface or groundwater features, and their related hydrologic functions. They are an important consideration in any environmental review.

Potential cumulative impacts are estimated by considering project effects within an expanded geographic area as well as a longer timeframe. For example, a cumulative impacts analysis should consider a reasonable and ecologically relevant area within which the proposed developed is located. Development in the recent past and probable development activities in the future should be described, and if relevant, mapped.

4.3. Mitigation Measures

Mitigation measures must be identified for each potential negative impact, to eliminate or reduce the impact to the extent possible. Preferred mitigation measures avoid or minimise impacts, and may be supported by compensatory measures such as site rehabilitation or restoration.

Avoiding or eliminating impacts through design (or redesign where necessary) is the preferred approach, and should always be considered as a first step. Designing around the feature is the only option when significant wetlands or significant habitat for endangered and threatened species occur within a proposed project’s boundaries. Recommendations for the preservation of natural features within or adjacent to the project area must be accompanied by recommendations regarding appropriate setback distance(s) and any buffer required to protect the feature and its ecological functions from impact.

Minimising impacts to the extent possible is expected when avoidance is not feasible. Examples include the establishment of strict limits on the extent of vegetation clearing, or the use of specific timing windows for construction to reduce impacts on wildlife by avoiding sensitive life stages such as breeding seasons or hibernation. The supporting rationale for these measures is to be included in the environmental report.

Compensation may be required in circumstances where impacts cannot be avoided or minimised. This includes consideration for the City of Edmonton's Corporate Tree Management Policy (C456A). Restoration and enhancement may also be recommended in the absence of such legal requirements, to support the long-term conservation of the City's natural systems.

In proposing mitigation measures, the environmental report should refer to recent science and/or guidelines, where necessary, to demonstrate that the measures will be sufficient to minimise impacts or replace lost habitat. The environmental report will include the following:

- A full description of proposed mitigation measures, including recommendations for timing windows or other specifications for implementation, for all potential negative impacts;
- For each negative impact, an indication of whether there will be any residual impact following implementation of the recommended mitigation measure(s);
- A description of proposed restoration or enhancement plans to compensate for impacts that cannot be avoided or minimised
- Maps and/or drawings (if relevant) depicting the location, extent, and design details of proposed mitigation measures.

Section Five: Environmental Monitoring

Where impacts have been avoided or minimised through the environmental review process, monitoring may not be needed. In cases where negative impacts have not been eliminated, or where innovative solutions are being used, monitoring may be required to measure impacts over time. The environmental report must identify any monitoring needs associated with the project, and should provide recommendations regarding the design and implementation of the required monitoring program. Consultation with City staff will be required to establish the scope of all monitoring programs, and to ensure that recommendations are feasible and appropriate.

Monitoring will usually be site-specific and may be required during the pre-construction, construction, and/or post-construction periods. The environmental report should:

- Clearly differentiate between monitoring recommendations aimed at ensuring effectiveness of mitigation, and any monitoring required for legal compliance (e.g. to meet conditions of a Certificate of Approval);
- Specify the appropriate stage(s), schedule and duration for the monitoring program;
- Propose appropriate thresholds or benchmarks for monitoring purposes;
- Identify who will be responsible for monitoring, and the reporting structure required to ensure that results are acted upon as needed; and,
- Outline contingency plans if an impact is detected or if the proposed thresholds are not met.

Section Six: Public Consultation

Open and transparent public involvement is required for all projects. The proponent should demonstrate that the affected public and other stakeholders have been given the opportunity to become involved in reviewing the project, and should indicate how the proponent has considered or addressed any resultant questions and concerns. The opportunity for public involvement benefits citizens most when they take an active role at an early stage in the process, and clearly articulate their specific questions or concerns.

Information on public consultation should include:

- A completed Public Involvement Plan;
- A summary of consultation sessions including a summary of the information collected; and
- A statement as to how public feedback has been incorporated into the project.

Section Seven: Conclusions and Supporting Information

The environmental report must include a concise summary that addresses major points and highlights any issues of concern. Limitations of the study should be clearly identified (e.g. assumptions, timing, context).

This section must include a conclusion based on the results of the impact analysis. The assessor's professional opinion must be stated, responding to the following questions:

- Provided that the recommended mitigation measures are implemented as planned, will there be any residual negative impacts on natural features or ecological functions as a result of the proposed project?
- What is the significance of any such residual negative impacts to ecological function(s)?
- Can the proposed project be accepted as planned, or should it be (further) revised to prevent, eliminate or reduce impacts? If so, what specific changes are recommended to the proposal?

If the environmental report concludes that the project will have a residual negative impact on one or more of the values or functions of the triggering feature(s), then a recommendation to proceed with the project must be accompanied by a rationale for proceeding that is based upon the provisions of the existing City of Edmonton statutory plans, policies etc. Projects with residual negative impacts to significant natural features or ecological functions may not be supported.

Supporting Information

Supporting information may include:

- Literature cited;
- A list of people contacted during the study, along with their title and agency affiliation, where applicable, and the subject(s) on which they were consulted;
- Species lists;
- Geotechnical reports;
- Groundwater monitored data, GW connectivity including flow lines and GW/SW interaction or modeling results following new structure
- Public Involvement Plan;
- Previous studies or reports that may apply to the subject site.

- Other City Approval and Requirements (Parkland Access Permit, Development Permit, Lease Agreement with Citizen Services & City Operation for safe operation and maintenance of the stair in the City Limit.
- The project team will be responsible for other jurisdictional approvals including water act, public land act, HRA, DFO, etc. These approvals could be attached for reference if available at the time of EIA reporting.

Appendix One: Guide to undertaking a *Site Location Study*

Pursuant to the North Saskatchewan River Valley Area Redevelopment Plan, all proposals for the development of a major facility that is publicly owned or is developed on public lands shall be subject to a Site Location Study detailing costs, and social, environmental and institutional constraints which make a River Valley location essential. The following identifies the information and reporting requirements for completing a Site Location Study.

The Site Location Study and related Environmental Impact Assessment shall require approval by City Council.

Project Name:

The Project Name should be the same as that referenced in the Environmental Impact Assessment.

Project Description:

Describe the project including location and surrounding context. This information can be copied directly from the accompanying Environmental Impact Assessment report. Where relevant, please include supporting maps.

Project Scope:

Identify what is included as part of this project. The Site Location Study should only reference project components that meet the definition of a Major Facility as defined in the North Saskatchewan River Valley Area Redevelopment Plan:

A MAJOR FACILITY is defined as any permanent or temporary development or use which is included in the Zoning Bylaw (12800) under the following use class definition:

- Basic service
- Community, educational, recreational, cultural services
- Natural resource development

Where relevant please include supporting plans and drawings which illustrate project components included as part of the Site Location Study.

A discussion of construction methodology or mitigation measures identified in the Environmental Impact Assessment is not required as part of the Site Location Study.

Location Analysis and Justification

The following questions must be addressed:

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

Please describe any relevant Bylaws/Plans/Policies which support the project's location within the North Saskatchewan River Valley Area Redevelopment Plan boundary.

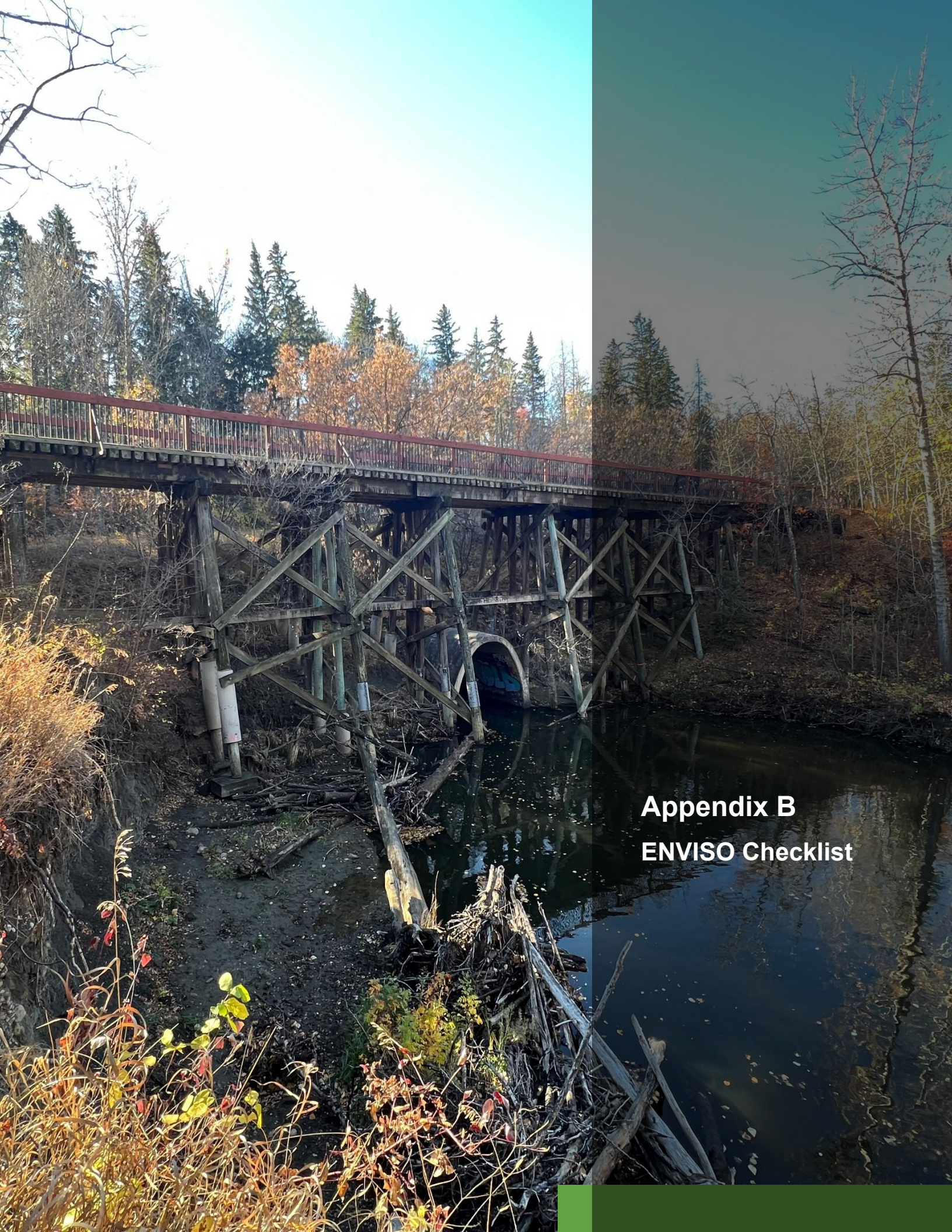
Opportunities and Constraints Analysis

The Site Location Study must identify potential constraints that relate to the project that make a river valley location essential. Do the constraints (financial, social, environmental, institutional) limit the feasibility of locating the project outside of the river valley?

If the project includes multiple *'Major Facility'* components, each component must be assessed separately to address the following questions:

1. What are the financial constraints which limit the feasibility of locating the project outside of the river valley?
    - Financial constraints
2. What are the social constraints which limit the feasibility of locating the project outside of the river valley?
    - Social constraints refer to the social behaviours and attributes that influence the sustainability of a proposed project within the City of Edmonton.
3. What are the environmental constraints which limit the feasibility of locating the project outside of the river valley?
    - Environmental constraints are defined as
4. What are the institutional constraints which limit the feasibility of locating the project outside of the river valley?
    - Institutional constraints are defined as

Conclusion



Appendix B

ENVISO Checklist

Environmental Permit / Approval Checklist					
Project: Mill Creek Trestle Bridge Rehab (B034)				**IIS Project Manager: Shafayat Hossain**	
Project Description: Rehabilitation of Mill Creek Trestle Bridge (B034)					
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**		Will be completed following fisheries field work and detailed design.
		"Application Form for Authorization" if required	U	tbd	DFO will dictate if Authorization or LOA. High expectation of Authorization for daylighting of stream, however should be able to offset in-situ
		Authorization or Letter of Advice obtained	U	tbd	DFO will dictate if Authorization or LOA.
		Fish Habitat Compensation Plan required	U	n/a	DFO will dictate if Authorization or LOA.
Transport Canada (Federal)	Canadian Navigation Waters Act	Review schedule to NPA and Minor Works and Waters Order (MWWO)	Y	n/a	Unscheduled, and unlikely to be navigated based on AT Navigation Map. Therefore not navigated under the CNWA. No submission required.
		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		Wildlife assessment has occurred. Wildlife sweep required for work during MCBA window
		Field Assessment (Nest Sweep) required before or during construction	Y		Pending construction schedule
	Species at Risk Act (SARA)	Search of ACIMIS, FWMIS and COSEWIC	Y	02-Apr-20	No SARA listed on ACIMS/FWMIS/COSEWIC Present
		Field Assessment required	Y		Field assessment occurred in Sept/Oct 2022 to provide information for 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 (Provincial)	Water Act	Codes of Practice (CP) review	Y		COP will be required for replacement of culvert.
		Notification sent if CP applicable			COP to be submitted at/following Tender
		Approval/License Required if CP is not applicable i.e. cannot meet requirements in CP	Y		Water Act required for bank stabilization/erosion control and realignment. Water Act to be submitted following detailed design.
		Wetland Assessment required by a QAES	N	n/a	no wetlands impacted
		Compensation Plan required	n/a	n/a	n/a
		Restricted Activity Periods (RAPs) applicable	N	n/a	Mapped class d, no RAP
	Environmental Protection and Enhancement Act (EPEA)	Consultation with Regulators	N	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 (Provincial)	Historical Resources Act (HRA)	HRA approval	Y		
		Consultation with First Nations required	U		
		Consultation with accredited archaeologist	Y		SOJ required, HRIA being completed now.
		Statement of Justification (SOJ) notification required	Y		SOJ required, HRIA being completed now.
		Historical Resource Impact Assessment (HRIA) required	U		SOJ required, HRIA being completed now.
		Clearance Letter received from ACCS	N		
Sustainable Resource Development (Provincial)	Public Lands Act	Department Licence of Occupation (DLO) or Temporary Deposition required	Y		DLO required for stream realignment and bank stabilization. Expect two DLOs needed
	Wildlife Act	Wildlife Assessment required	Y		Wildlife assessment occurred for EIA
		Restriction on activities	N		Construction timing and sweeps

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	Y		Tree Protection Plan to be completed as part of design
	Community Standards Bylaw	Noise Exemption Permit required	U	n/a	To be determined at construction
	River Valley Bylaw 7188	North Saskatchewan River valley ARP Project review form completed and submitted	Y	15-Sep-22	Scoped directly. No form required (EIA required). ARP form required seperately for Geotech program. .
		Environmental Report required	Y		**EIA is restarting following prelim design.**
	Contaminated Sites	COE - Engineering Services consultation to check their database and ESAR (Alberta Environment's Environmental Site Repository)	Y	18-Oct-22	CoE advised that all soils will be considered contaminated and disposed of at Class III Landfill
		Further assessment recommended	N		
	Drainage Bylaw	Permit required to discharge site effluent into Storm / Combined / Sewer	N	n/a	n/a
	Erosion & Sedimentation Control	Permanent ESC Design required	Y		Permanent erosion/bank protection will be included in design
	Wildlife Passage Engineering Design Guidelines (WPEDG)	Wildlife Passage Design required & Complete Appendix D Checklist of WPEDG	Y		Wildlife passage will be facilitated under the new bridge. Checklist will be completed for EIA
	Natural Area Systems Policy	Natural Area may be impacted by project	Y		EIA ongoing for impacts to natural area
Completion Verification					
Completed By:				**Date:**	2024-10-11
Comments:					
					Version 1.15

Appendix C
Vegetation

Plate 1 View of potential temporary workspace at 77 Ave (October 5, 2022, UTM:335956E/ 5932238N)

Plate 2 View of potential temporary workspace north of 76 Ave, west of trestle bridge (October 5, 2022, UTM:336156E/ 5932106N)

Plate 3 View of trestle bridge (October 5, 2022, UTM:336219E/ 5932102N)

Plate 4 View of trestle bridge (October 5, 2022, UTM: 336225E/ 5932099N)

Plate 5 View of potential temporary workspace north of 76 Ave, east of trestle bridge (October 5, 2022 UTM: 336420E/ 5932099N)

Plate 6 View of trestle bridge and outfall (October 5, 2022, UTM: 336247E/ 5932127N)

Plate 7 View of trestle bridge and outfall (October 5, 2022; UTM: 336234E/ 5932159N)

Plate 8 View of outfall on south side of 76 Ave (October 5, 2022; UTM: 336298E/ 5932076N)

Plate 9 View of white cockle (October 5, 2022; UTM: 336217E/ 5932145N)

Plate 10 View of Canada thistle (October 5, 2022; UTM: 336342E/ 5932100N)

Plate 11 View of common tansy (October 5, 2022; UTM: 336360E/ 5932069N)

Plate 12 View of garlic mustard (June 24, 2020; UTM: 336318E/ 5932118N)

Plate 13 View of SW4 community (October 5, 2022; UTM: 336344E/ 5932066N)

Plate 14 View of PB3 community (October 5, 2022; UTM: 336223/ 5932130N)

Plate 15 View or riparian wildlife habitat (September 27, 2022; UTM: 336060E/ 5932598N)

Plate 16 View of mature conifer and walkways (September 27, 2022; UTM: 336023E/ 5932622N)

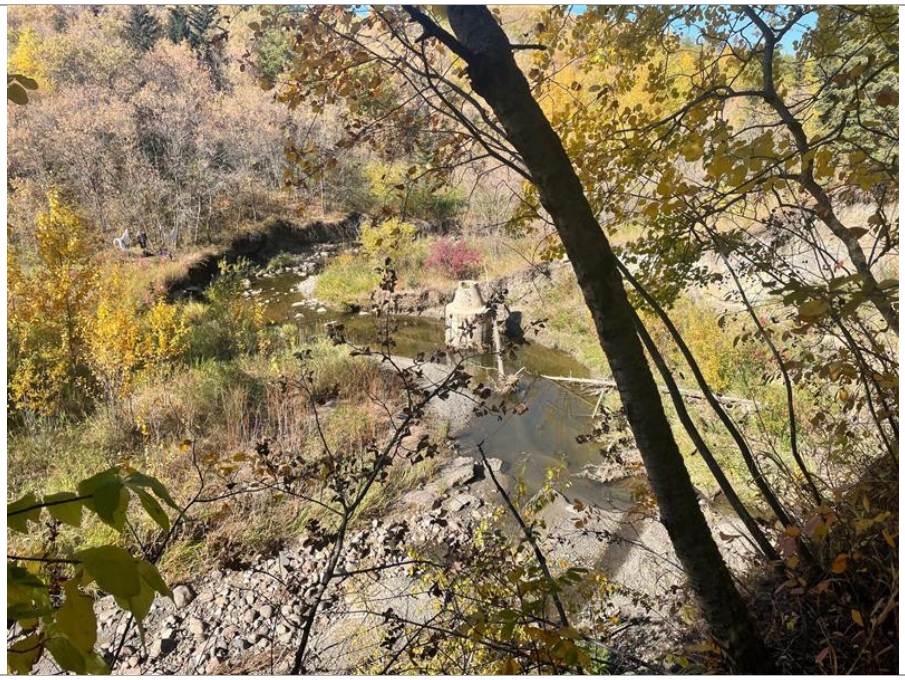


Plate 17 View of riparian wildlife habitat (September 27, 2022; UTM: 336876E/ 5932478N)

Plate 18 View of immature mixed wood stand (September 27, 2022; UTM: 336252E/ 5932247N)

Plate 19 View of stick nest, likely crow or raven (September 27, 2022; UTM: 336125/ 5932747)

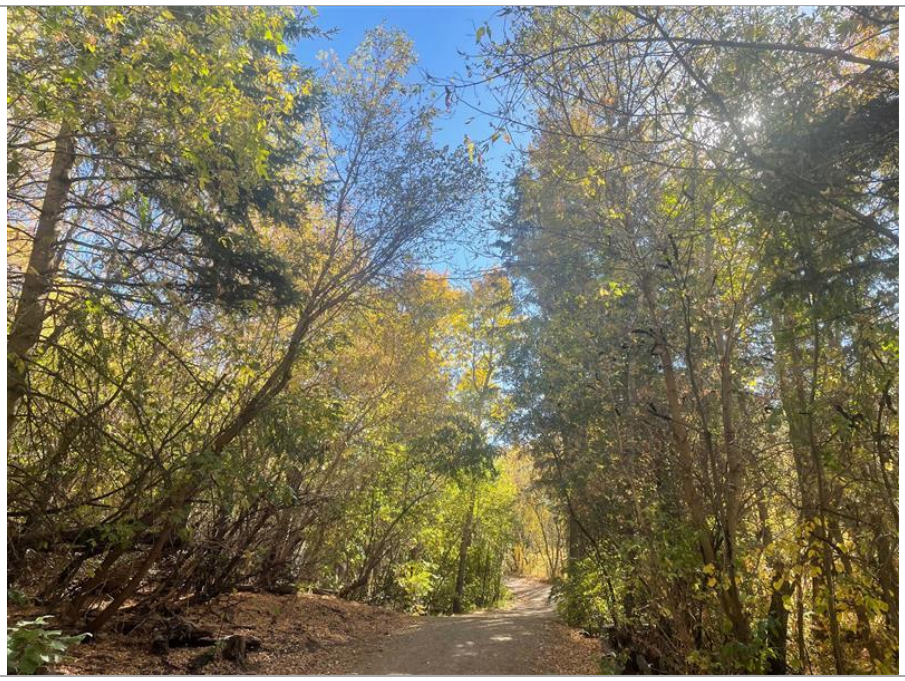
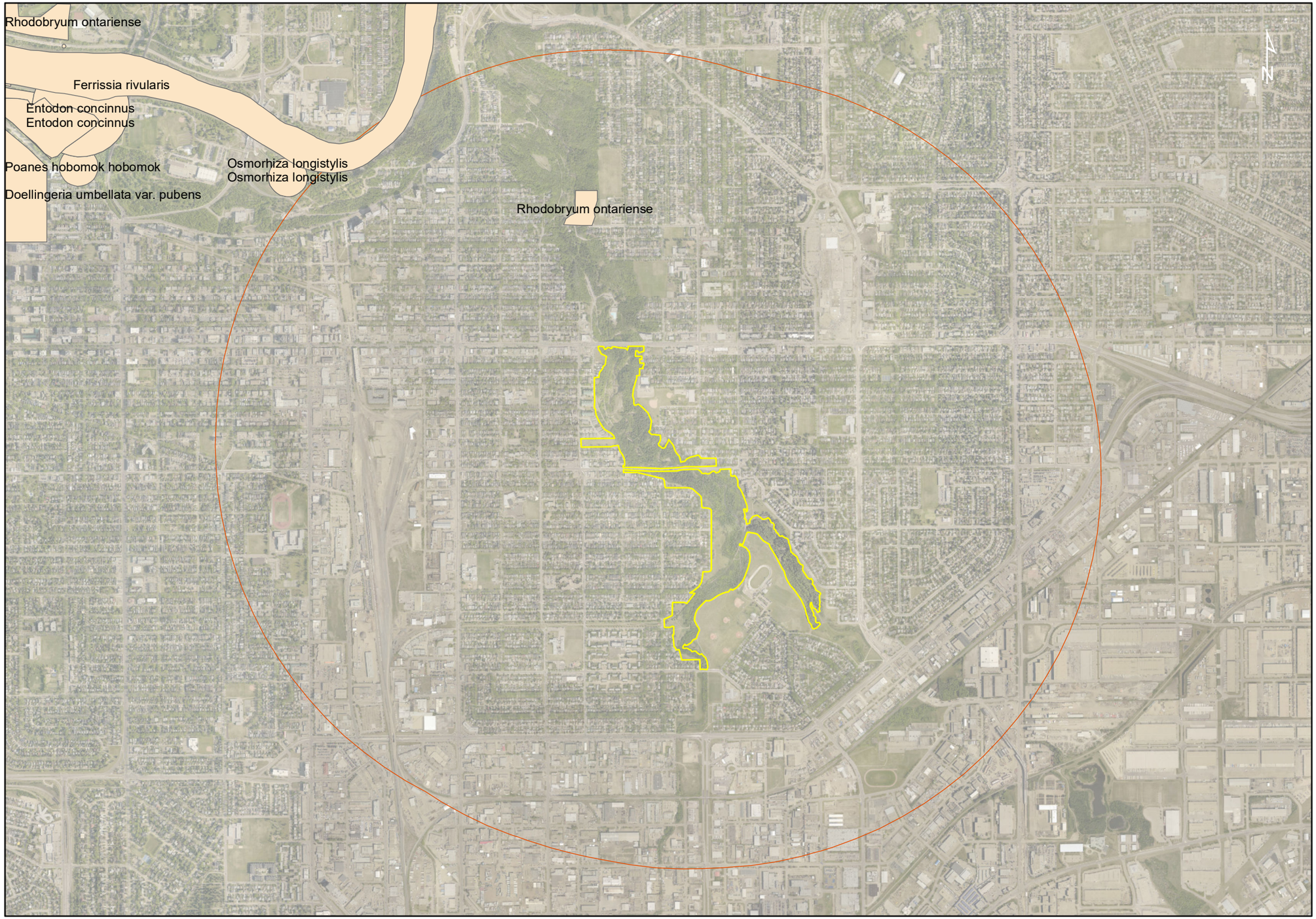


Plate 20 View of immature mixed wood stand (September 27, 2022; UTM: 336292E/ 5931035N)



Legend

- 2km Buffer
- ACIMS Occurences
- LSA

0 0.35 0.7 Kilometers

ACIMS OCCURENCES

Edmonton

ISL

Credits:Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Table A: Rare Vascular Plant Species within the Central Parkland Natural Subregion

Scientific Name	Common Name	Rank (Provincial)
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

Scientific Name	Common Name	Rank (Provincial)
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 B: Rare Mosses within the Central Parkland Natural Subregion

Scientific Name	Common Name	Rank (Provincial)
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

Scientific Name	Common Name	Rank (Provincial)
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

Table C: Rare Lichens within the Central Parkland Natural Subregion

Scientific Name	Common Name	Rank (Provincial)
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

Scientific Name	Common Name	Rank (Provincial)
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 D: Rare Ecological Communities in the Central Parkland Subregion

Scientific Name	Common Name	Rank (Provincial)
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?

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

Table E: Vegetation Species Observed During the October 2022 and June 2023 Field Assessments

Scientific Name	Common Name	Provincial Rank	Location		
			TWS at 77 AVE	Workspace North of 76 AVE	Workspace South of 76 AVE
Trees and Shrubs					
Betula species	Birch species	-		X	X
Populus tremuloides	aspen	S5		X	X
Populus balsamifera	balsam poplar	S5		X	X
Corylus cornuta	beaked hazelnut	S5		X	X
Elaeagnus commutata	silverberry	S5		X	
Shepherdia canadensis	Canada buffaloberry	S5			X
Prunus virginiana	choke cherry	S5		X	X
Rosa woodsii	common wild rose	S5		X	X
Viburnum edule	low-bush cranberry	S5		X	X
Acer negundo	Manitoba maple	SU		X	X
Actaea rubra	red and white baneberry	S5			X
Sambucus racemosa	red elderberry	S4			X
Cornus stolonifera	red-osier dogwood	S5		X	X
Salix interior	sandbar willow	S5			X
Amelanchier alnifolia	saskatoon	S5		X	X
Sorbus sitchensis	Sitka mountain ash	S3		X	X
Elaeagnus commutata	silverberry	S5		X	
Ribes glandulosum	skunk currant	S5			X
Ribes lacustre	bristly black currant	S5		X	
Symphoricarpos albus	snowberry	S5		X	X
Sorbus scopulina	western mountain-ash	S5		X	X
Picea glauca	white spruce	S5		X	X
Rubus idaeus	wild red raspberry	S5		X	X
Salix sp	willow species	-			X
Sambucus racemosa	red elderberry	S5		X	X
Amelanchier alnifolia	saskatoon	S5		X	
Forbs					
Aster sp.	Aster species	-		X	X
Aralia nudicaulis	wild sarsaparilla	S5		X	
Petasites frigidus	coltsfoot	S5		X	X
Chamerion angustifolium	common fireweed	S5		X	X
Lathyrus species	Vetchling species	-		X	
Prosartes trachycarpa	fairybells	S5			X
Solidago sp.	Goldenrod species	-		X	X
Achillea alpina	many-flowered yarrow	S5		X	
Equisetum pratense	meadow horsetail	S5		X	X
Rumex species	Dock or sorrel species	-			X
Galium boreale	northern bedstraw	S5		X	
Epilobium ciliatum	northern willowherb	S5		X	
Eurybia conspicua	showy aster	S5		X	
Thalictrum venulosum	veiny meadow rue	S5			X
Urtica gracilis	common nettle	S5		X	
Viola sp	Violet species	-		X	X
Vicia americana	wild vetch	S5		X	X

Scientific Name	Common Name	Provincial Rank	Location		
			TWS at 77 AVE	Workspace North of 76 AVE	Workspace South of 76 AVE
Persicaria amphibia	water smartweed	S5		X	
Mentha arvensis	wild mint	S5		X	X
Maianthemum stellatum	star-flowered Solomon's-seal	S5		X	
Maianthemum canadense	wild lily-of-the-valley	S5		X	
Grasses, Sedges, Rushes					
carex sp	sedge species	-		X	X
Elymus sp.	*Elymus* species	-			X
Bromus ciliatus	fringed brome	S5		X	
Phalaris arundinacea	reed canary grass	S5		X	X
Poa pratensis	Kentucky bluegrass	S5	X	X	X
Poa species	Bluegrass sp.	-	X	X	X
Poa palustris	fowl bluegrass	S5		X	
Scirpus microcarpus	small-fruited bulrush	S5		X	
Invasive or Non-native plants					
Arctium minus	**common burdock**	**SNA**		X	
Agropyron cristatum	crested wheatgrass	SNA		X	
Asparagus officinalis	asparagus	SNA			X
Artemisia absinthium	absinthe wormwood	SNA		X	
Chenopodium album	lamb's-quarters	SNA		X	
Medicago sativa	alfalfa	SNA		X	X
Silene latifolia	**white cockle, bladder campion**	**SNA**		X	
Galium aparine	cleavers	SNA		X	X
Caragana arborescens	common caragana	SNA		X	
Taraxacum officinale	common dandelion	SNA	X	X	X
Galeopsis tetrahit	common hempnettle	SNA			x
Tanacetum vulgare	**common tansy**	**SNA**			X
Trifolium hybridum	alsike clover	**SNA**		X	
Cirsium arvense	**Creeping [Canada] thistle**	**SNA**		X	X
Sorbus aucuparia	European mountain-ash	SNA		X	X
Tripleurospermum inodorum	**scentless chamomile**	SNA			
Alliaria petiolata	**Garlic mustard**	**SNA**		X	X
Echinochloa crus-galli	large barnyard grass	SNA		X	
Sonchus arvensis	**perennial sow-thistle**	**SNA**		X	X
Lactuca serriola	prickly lettuce	SNA		X	
Thlaspi arvense	stinkweed	SNA		X	
Plantago major	nipple-seed plantain	SNA			X
Matricaria discoidea	pineappleweed	SNA		X	
Medicago lupulina	black medick	SNA		X	
Cotoneaster acutifolius	Peking cotoneaster	SNA		X	X
Bassia scoparia	summer-cypress	SNA		X	
Bromus inermis	smooth brome	SNA		X	
Phleum pratense	timothy	SNA		X	
Melilotus officinalis	yellow sweet-clover	SNA			X

Scientific Name	Common Name	Provincial Rank	Location		
			TWS at 77 AVE	Workspace North of 76 AVE	Workspace South of 76 AVE
Other					
-	Crabapple species (Volunteer)	-		X	
-	Bur Oak (likely planted)	-		X	
-	Unknown pine species (planted)	-		X	

Sources: ACIMS 2017a,b,c,d, 2018

Notes: 1 Bold denotes a Noxious or Prohibited 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 2022.

Appendix D

Wildlife

Species of Conservation Concern Potentially within the Project Area

Common Name	Scientific Name	SARA[1]	AWA[2]	Alberta General Status[3]
Amphibians				
Barred Tiger Salamander	*Ambystoma mavortium*	Not Listed	Not Listed	Secure
Canadian Toad	*Anaxyrus hemiophrys*	Not Listed	Not Listed	May be at Risk
Birds				
American Bittern	*Botaurus lentiginosus*	-	-	Sensitive
American Kestrel	*Falco sparverius*	-	-	Sensitive
American White Pelican	*Pelecanus erythrorhynchos*	-	-	Sensitive
Baird's Sparrow	*Ammodramus bairdii*	Special Concern	-	Sensitive
Bald Eagle	*Haliaeetus leucocephalus*	-	-	Sensitive
Baltimore Oriole	*Icterus galbula*	-	-	Sensitive
Bank Swallow	*Riparia riparia*	Threatened	-	Sensitive
Barn Swallow	*Hirundo rustica*	Threatened	-	Sensitive
Barred Owl	*Strix varia*	-	Special Concern	Sensitive
Black Tern	*Chlidonias niger*	-	-	Sensitive
Black-backed Woodpecker	*Picoides arcticus*	-	-	Sensitive
Black-crowned Night-Heron	*Nycticorax nycticorax*	-	-	Sensitive
Bobolink	*Dolichonyx oryzivorus*	Threatened	-	Sensitive
Brewer's Sparrow	*Spizella breweri*	-	-	Sensitive
Brown Creeper	*Certhia americana*	-	-	Sensitive
Chestnut-collared Longspur	*Calcarius ornatus*	Threatened	-	At Risk
Clark's Nutcracker	*Nucifraga columbiana*	-	-	Sensitive
Common Nighthawk	*Chordeiles minor*	Threatened	-	Sensitive
Common Yellowthroat	*Geothlypis trichas*	-	-	Sensitive
Eastern Kingbird	*Tyrannus tyrannus*	-	-	Sensitive
Eastern Phoebe	*Sayornis phoebe*	-	-	Sensitive

Common Name	Scientific Name	SARA[1]	AWA[2]	Alberta General Status[3]
Ferruginous Hawk	*Buteo regalis*	Threatened	Endangered	At Risk
Forster's Tern	*Sterna forsteri*	-	-	Sensitive
Golden Eagle	*Aquila chrysaetos*	-	-	Sensitive
Great Blue Heron	*Ardea herodias*	-	-	Sensitive
Horned Grebe	*Podiceps auritus*	Special Concern	-	Sensitive
Lark Bunting	*Calamospiza melanocorys*	Threatened	-	Sensitive
Least Flycatcher	*Empidonax minimus*	-	-	Sensitive
Loggerhead Shrike	*Lanius ludovicianus*	-	Special Concern	Sensitive
Long-billed Curlew	*Numenius americanus*			
Northern Goshawk	*Accipiter gentilis*	Special Concern	Special Concern	Sensitive
Northern Pygmy-Owl	*Glaucidium gnoma*	-	-	Sensitive
Olive-sided Flycatcher	*Contopus cooperi*	-	-	Sensitive
Osprey	*Pandion haliaetus*	Threatened	-	May Be at Risk
Peregrine Falcon	*Falco peregrinus*	-	-	Sensitive
Pied-billed Grebe	*Podilymbus podiceps*	-	Threatened	At Risk
Prairie Falcon	*Falco mexicanus*	-	-	Sensitive
Rusty Blackbird	*Euphagus carolinus*	-	Special Concern	Sensitive
Sandhill Crane	*Grus canadensis*	Special Concern	-	Sensitive
Sharp-tailed Grouse	*Tympanuchus phasianellus*	-	-	Sensitive
Short-eared Owl	*Asio flammeus*	-	-	Sensitive
Sora	*Porzana carolina*		-	
Sprague's Pipit	*Anthus spragueii*	Special Concern	-	May Be At Risk
Trumpeter Swan	*Cygnus buccinator*	-		Sensitive
Upland Sandpiper	*Bartramia longicauda*		Special Concern	
Western Grebe	*Aechmophorus occidentalis*	Threatened	Special Concern	Sensitive
Western Tanager	*Piranga ludoviciana*	-	-	Sensitive
Western Wood-Pewee	*Contopus sordidulus*		Threatened	
Yellow Rail	*Coturnicops noveboracensis*	-	-	Sensitive

Common Name	Scientific Name	SARA[1]	AWA[2]	Alberta General Status[3]
Mammals				
American Badger	*Taxidea taxus*	-	Data Deficient	Sensitive
Canadian Lynx	*Lynx canadensis*	-	-	Sensitive
Grizzly Bear	*Ursus arctos*	Special Concern	Threatened	At Risk
Little Brown Myotis	*Myotis lucifugus*	Endangered	-	May Be at Risk
Long-tailed Weasel	*Mustela frenata*	-	-	May Be at Risk
Silver-haired Bat	*Lasionycteris noctivagans*	-	-	Sensitive
Reptiles				
Plains Garter Snake	*Thamnophis radix*	-	-	Sensitive
Terrestrial Garter Snake	*Thamnophis elegans*	-	-	Sensitive

Fish and Wildlife Internet Mapping Tool (FWIMT)

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

Species Summary Report

Report Date: 01-Nov-2022 18:10

Species present within the current extent

Fish Inventory	Wildlife Inventory	Stocked Inventory
BROOK STICKLEBACK	BROWN CREEPER	BROOK TROUT
FATHEAD MINNOW	CANADIAN TOAD	RAINBOW TROUT
	NORTHERN GOSHAWK	
	PEREGRINE FALCON	

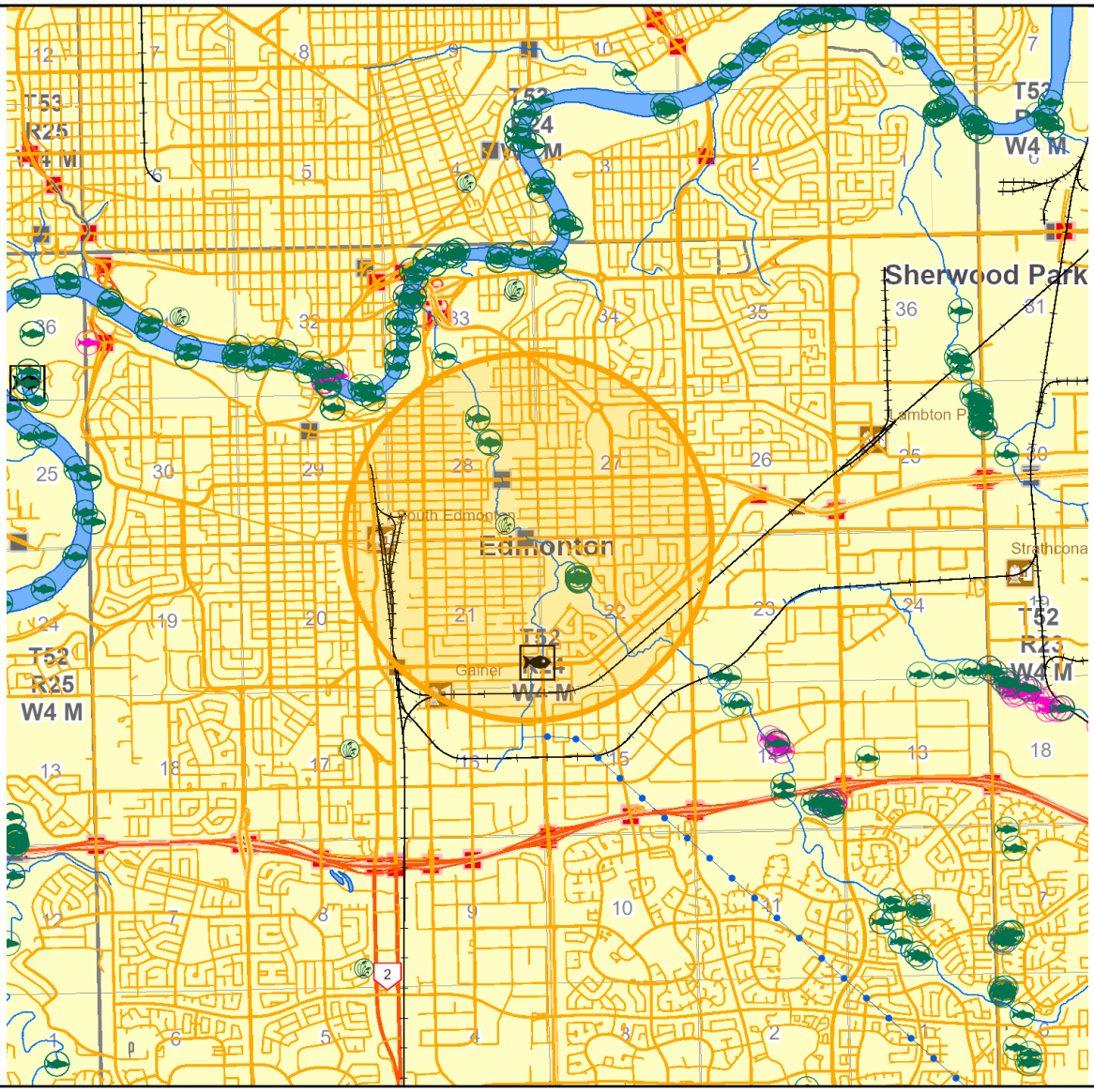
Buffer Extent

Centroid (X,Y)	Projection	Centroid (Qtr Sec Twp Rng Mer)	Radius or Dimensions
601472, 5927983	10-TM AEP Forest	SE 28 52 24 4	2 kilometers

Contact Information

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

01-Nov-2022 18:10 **Map Results**



Appendix E
Fish and Fish Habitat

Fish and Wildlife Internet Mapping Tool (FWIMT)

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

Species Summary Report

Report Date: 17-Dec-2024 16:07

Species present within the current extent

Fish Inventory	Wildlife Inventory	Stocked Inventory
BROOK STICKLEBACK	BROWN CREEPER	BROOK TROUT
FATHEAD MINNOW	CANADIAN TOAD	RAINBOW TROUT
	NORTHERN GOSHAWK	
	PEREGRINE FALCON	

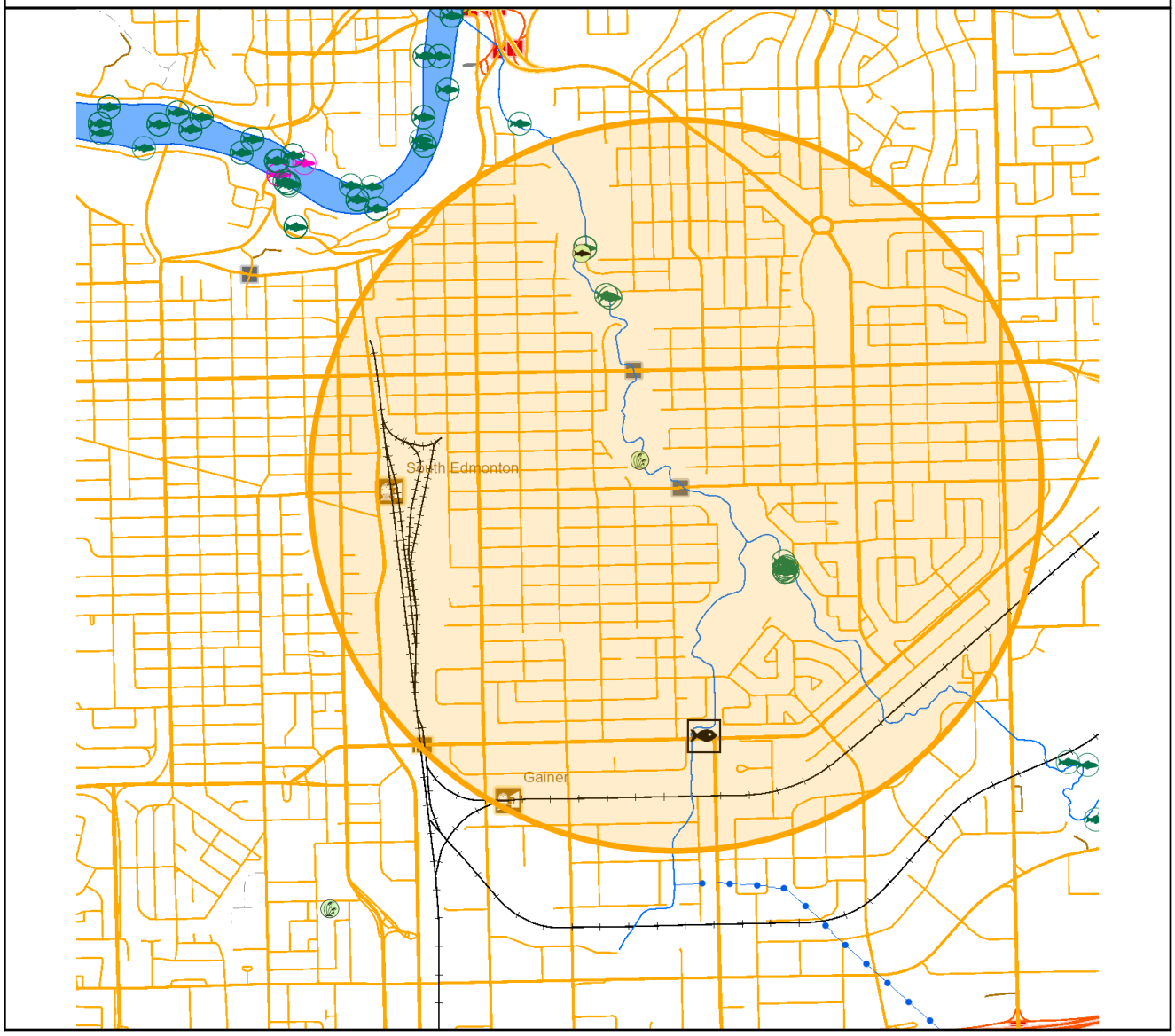
Buffer Extent

Centroid (X,Y)	Projection	Centroid (Qtr Sec Twp Rng Mer)	Radius or Dimensions
601418, 5927985	10-TM AEP Forest	SE 28 52 24 4	2 kilometers

Contact Information

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

17-Dec-2024 16:07 **Map Results**



Appendix F
Historical Resources

City of Edmonton - Mill Creek Trestle Bridge (B034) Rehabilitation

Historic Resources Act Clearance Application

City of Edmonton
Transportation Planning & Design Group
Edmonton Tower - 10111-104 Ave NW,
Edmonton, AB.
T5J 0J4

Prepared by:

Turtle Island Cultural Resource Management Inc.
5 Creston Crescent NW. Calgary, Alberta T2M 4J9

November 15, 2022

Statement of Justification for Historical Resources Act Requirements

Purpose:

HRA clearance conditions are requested, an HRIA is recommended.

Project Name/Identifier:

Mill Creek Trestle Bridge (B034) Rehabilitation

Disposition Type & Number:

N/A

Developer/Proponent:

City of Edmonton

Contact Name:

Mitchell Schutta - Project Manager

Company Name:

City of Edmonton

Address:

Transportation Planning & Design Group
Edmonton Tower - 10111-104 Ave NW,
Edmonton, AB.
T5J 0J4

Phone Number:

403-442-1757

E-Mail Address:

mitchell.schutta@edmonton.ca

Project Type and Description:

Originally constructed in 1902 CE, and located in the Mill Creek ravine parallel to 76 Avenue and spanning Mill Creek, the Mill Creek Trestle Bridge (B034) is a simple wood trestle structure that was part of the early rail connection between the communities of Strathcona/Edmonton and the Canadian Pacific Railway at Calgary. To traverse the slope of the North Saskatchewan River valley, tis railway line descended through the Mill Creek ravine to its crossing of the North Saskatchewan River sat the Low Level Bridge. This crossing was bypassed by the construction of the High Level Bridge in 1913 CE. The railway's passenger service was suspended in 1928. The bridge was used to haul coal and freight until 1954 CE when it was closed, and the tracks were removed. The bridge was later converted for pedestrian use and remains a valuable part of the Edmonton River Valley pedestrian and bikeway trail system. The structure has been rehabilitated several times in the past and very little of the original structure remains. Due to the age of the structure and changes in ownership, records are limited. The Mill Creek Trestle Bridge (B034) was designated as a Municipal Historic Resource in 2004 under Bylaw 13472.

A condition inspection (Morrison Hershfield, December 2021) identified several concerns including visible settlements/movements of the bridge deck, suspected loss of bearing support at selected timber piles, loss of, and deformation of several timber piers, and damage to the associated culvert.

In addition, Thurber Engineering Ltd. conducted a desktop study for the bridge site also in 2021. This desktop study indicated that there were potential slope stability concerns just north of the bridge along the eastern side-slope. Further slope erosion and retrogression of the slope can be expected unless appropriate slope protection and slope flattening are undertaken. Remediation options would include reshaping of the eroded slope followed by the placement of protective rip rap or gabion baskets to protect

the slope from further undercutting and instability.

Project size:

The Project area is approximately 2.88 ha, and impacts four LSD's included on the Listing of Significant Resource Sites (Oct. 2022).

Lands Affected:

Land Ownership Type: Municipal, See table below:

Meridian	Range	Township	Section	Quarter	LSD	HRV	Category
4	24	52	27	SW	4	4, 5	a, p
4	24	52	28	SE	1	4, 5	a, p
4	24	52	21	NE	16	4, 5	a, p
4	24	52	22	NW	13	4, 5	a, p

Table 1: Legal descriptions / HRV

Anticipated Ground Disturbance:

Ground disturbance will include the replacement of the bridge foundations with bored, re-enforced concrete regular, or micro piles. In addition, a slope failure on the west side of Mill Creek, immediately down stream from the trestle bridge, will need to be repaired. The elements of the bridge structure itself will be replaced and/or repaired as required. The design and character of the structure will be maintained despite this rehabilitation and repair work.

Excavation will be carried out to facilitate the slope repair. These excavations will include the regrading of the slope and the installation of rip rock and/or gabion cages to protect the new slope. Excavations related to access will be required to facilitate the slope repair.

Existing Disturbance:

The Mill Creek Trestle Bridge is one of three built in the Mill Creek ravine in 1902 CE as part of the Yukon and Pacific Railway. The construction of this railway included significant cut and fill earth works at both abutments of the structure. Further disturbance was caused by the construction of the 76th Avenue crossing of Mill Creek which is located immediately to the south of the trestle

Figure 1: Archival and contemporary photographs of development area

bridge (Figure 1).

Geotechnical assessment was carried in relation to this project, including the excavation of three bore holes (Table 2). The upper most portions of all of these bores contained unsorted gravel and stones typical of constructed substrate. Bore holes TH-01 and TH-02 were excavated within the former railway RoW where disturbed sediment of this type is expected. Samples at TH-03 were

Depth (cm)	Date	Bore Hole #		
		TH22-01	TH22-02	TH22-03
0.3	03-Nov-22	black organic - gravel and coal fragments	brown sand - unsorted gravel and ston	brown sand - unsorted gravel
0.46	03-Nov-22	brown sand - unsorted gravel	N/A	N/A
0.5	03-Nov-22	N/A	unsorted gravel - grey sand	gravel - road crush
0.76	03-Nov-22	brown clay - roots	unsorted stones - gravel and sand	brown sand - unsorted gravel
1.52	03-Nov-22	tan/red fine sand -some clay	brown/tan sand - unsorted gravel	brown/red sand - some clay sticks and organics
2.29	03-Nov-22	N/A	dark brown sand - unsorted gravel	grey sand - some roots and clay
2.74	03-Nov-22	brown/red/tsan clay - some coal and charcoal flec	N/A	N/A

Table 2: Geotechnical bores (n=3)

collected from the area of the slope failure and may be related to an existing SUP at this location in addition to the adjacent former railway grade. Extensive excavation and filling activities related to these transportation RoWs have likely disturbed the project area in its entirety. However, portions of the Mill Creek Ravine slope associated with the area of proposed erosion repair may be intact.

Landscape and Environmental Information:

The project area spans the Mill Creek Ravine immediately adjacent to 76th Avenue (Figure 2). This area is currently the location of a road RoW and has been significantly modified to facilitate the construction of a railway grade. The Mill Creek Trestle Bridge was part of this railway RoW. Historically, the location would have consisted of slope wash and/or slump deposits incised by small draws and drainages. Mixed aspen and white spruce forest are typically found on the slopes and margins of the Mill Creek ravine. As illustrated by archival photographs of the proposed development area, the ravine at this location has been significantly modified and landscaped to facilitate the construction of the railway, and contemporary road RoWs.

Illustrative Material (Attached in OPAC):

20221109_Report Map 1
34892-1 (Geotech bore locations)
MC Trestle Site Extents

Historical Resource Type: Archaeological Resources

FjPi-184

HRV: 0

Relationship to Activity and Anticipated Impacts:

Site FjPi-184 is located within the slope failure area of the proposed development. The site will be impacted by the proposed ground disturbance activities.

Permit Number(s): N/A - public reported

Relationship to Project or Activity: Within the slope repair portion of the project, and will be impacted.

Relationship to Project or Activity: Adjacent to North Saskatchewan River, no relationship.

FjPi-172

HRV: 4

Relationship to Activity and Anticipated Impacts:

Site FjPi-172 is 1100 m southeast of the proposed development. The site will not be impacted by the proposed ground disturbance activities.

Permit Number(s): ASA 17-047

Relationship to Project or Activity: Mill Creek Ravine, no relationship.

Figure 2: Location of proposed development

FjPi-173

HRV: 4

Relationship to Activity and Anticipated Impacts:

Site FjPi-173 is 1300 m north of the proposed development. The site will not be impacted by the proposed ground disturbance activities.

Permit Number(s): McKay reserved, 2017

Relationship to Project or Activity: Mill Creek Ravine, no relationship.

Proximity to HRV1 and/or HRV 2 Sites:

None

Evaluation

Geotechnical testing by Thurber Engineering within the project area has identified unsorted gravel and stones with sand and clay. These deposits are likely a result of the construction of this railway, road, and SUP RoWs within the project area. Although the terrace edges and slopes of the Mill Creek Ravine have a high potential for intact cultural resource sites, previous construction and landscaping of this area has likely left little intact.

However, an isolated find, consisting of a large quartzite biface, was found in the area of the proposed slope repair and was recorded as the cultural resource site FjPi-184. The presence of this artefact suggest an intact cultural deposit may be located nearby. Consequently, field assessment for the slope repair portion of the development is warranted.

Recommendations

(Recommendations regarding archaeological resources must be made by a professional archaeologist)

Archaeology

1. **A Historical Resource Impact Assessment (HRIA) is recommended for the proposed project.** The proposed development will potentially impact intact sediment in areas of the slope repair portion of the Mill Creek Trestle Bridge Rehabilitation Project. A completed design concept, and construction plans will determine these impacts. A permit application, or amended clearance application, will be submitted when this information is available.

Recommendations made by:

Gareth Spicer, MA.
Principle Archaeologist
Turtle Island CRM
P: 403-620-9032
F: 403-450-9267
gareth@turtleislandcrm.com

SoJ - Palaeontological Statement of Justification

Mill Creek Trestle Bridge (B034) Replacement

Prepared for Turtle Island CRM

January 16th, 2023

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

Statement of Justification for *Historical Resources Act*

This document contains sensitive information about Historic Resources that are protected under the provisions of the Alberta Historical Resources Act. This information is to be used to assist in planning the proposed project only. It is not to be disseminated, and no copies of this document are to be made without written permission of the Historic Resources Management Branch, Alberta Culture and Tourism.

Project Name or Project Identifier:
Mill Creek Trestle Bridge (B034) Replacement

Disposition Type & Number:
N/A

Developer/Proponent:
City of Edmonton

Name of proponent contact: Mitchell Schutta – Project Manager
Company: City of Edmonton, Transportation planning and Design Group
Address: Edmonton Tower – 10111-104 Ave NW, Edmonton AB, T5J 0J4
Phone number: 403-442-1757
E-mail address: mitchell.schutta@edmonton.ca

Lands Affected:
Land Ownership Type: Crown Land – City of Edmonton.

Legal Description/HRV:

Table 1: Listed Lands Affected

MER	RGE	TWP	SEC	LSD	HRV	Category
4	24	52	27	4	4,5	a,p
4	24	52	28	1	4,5	a,p
4	24	52	21	16	4,5	a,p
4	24	52	22	13	4,5	a,p

Activity type and Anticipated Ground Disturbance:
The Mill Creek Trestle Bridge (B034) is located in the Mill Creek Ravine and parallels 76 Avenue in Edmonton (Figure 1). Constructed in 1902 as a rail connection between Edmonton and Strathcona until 1928, and to haul coal and freight until 1954, the bridge was later converted to pedestrian use. A 2021 inspection found multiple concerns including: visible settlement/movement of the bridge deck, loss of and deformation of support timbers, loss of bearing support at timber piers, and damage to the culvert system. Additional concerns included slope stability and retrogression along the bank of Mill Creek immediately to the north of the bridge.

While a final remediation plan has not been finalized, it is expected that the Project will include: replacement of the bridge foundation, including a works space and either driven or concrete poured pilings, reshaping of the eroded slope followed by the placement of protective rip rap or gabion baskets to protect against further erosion, access roads and workspaces as required.

Project size:
The Project area is approximately 2.88 ha.

Existing Disturbance:
The Project is located within Mill Creek ravine. Original construction of the bridge and previous rehabilitations are likely to have disturbed the surficial material around the bridge itself. Historical photographs of the construction support that the area immediately surround the bridge was heavily modified during construction. This is largely supported by the geotechnical work completed by Thurber (Law and Tweedie, 2002) which indicates that most of the subsurface around the bridge consists of fill on bed rock, with only one indication of intact alluvial gravels at approximately 4m depth on the west side (Bore Hole TH22-1). The slope remediation area to the north of the bridge looks to be undisturbed (Photo 2 from the Thurber Report; Figure 4) as well bedded alluvial sand and gravel deposits are visible on the eastern cut bank.

Landscape and Environmental Information:
The proposed Project is located within the Mill Creek Ravine. The creek does not have an extensive flood plain, thought open gravel bars and high-water spillway channels are evident. Erosional cut banks are preset on some of the creek meanders, exposing surfical sediment stratigraphy and potentially underlying bedrock. The remainder of the ravine is heavily forested.

Geology:
The surficial geology on the ravine floor at the proposed Project locality is comprised of alluvial river gravel and cobbles and colluvium from the ravine walls. The surrounding topographic plain is covered with glacio-lacustrine silt and clay from glacial Lake Edmonton (Figure 2; Bayrock, 1972).

Bedrock at the proposed Project location is comprised of the Horseshoe Canyon Formation (Figure 3), which represents the lower part of the Edmonton Group in central Alberta, and is composed primarily of sandstone interbedded with siltstone and mudstone. The Horseshoe Canyon Formation also includes ten seams of potentially economic coal. Depositional environments are brackish to fresh water in origin and include marginal marine, to estuarine to lacustrine settings (Shepheard and Hills, 1970; Rahmani, 1988). The lower half of the Formation is represented by several minor marine transgressive cycles which led to the formation of the afore mentioned coal seams. The

upper half is predominantly represented by fluvial to lacustrine conditions and thus devoid of coal with the exception of the Carbon-Thompson zone at the top.

Palaeontology:
Neither the glacio-lacustrine surficial sediment located on the topographic plain or the colluvium on the ravine walls or floor are likely to produce significant fossil resources, however the bedded alluvial river terrace deposits present in the slope rehabilitation area do have the potential to produce significant palaeontological resources. The Edmonton area has produced a wealth of Quaternary macro-fossils. These fossils have primarily been found in exposures along the edge of the North Saskatchewan River and record members of both extinct and extant animals including: mammoth (Hay, 1924), horse (Hay, 1927; Weinstock *et al*., 2005), muskoxen (Harington, 1975; Wilson *et al.*, 2008; Jass *et al*., 2011), the predators *Canis lupus*, *Arctodus simus*, *Panthera leo atrox* (Burns and Young, 1994). In addition, micro-fossils of lemmings have been identified (Burns, 2004).

A palaeontological HRV value of 4 has been assigned for LSD 13-22-52-24W4 as it contains the Mill Creek Palaeo Locale. Several palaeontological locales are known from the Horseshoe Canyon Formation in surrounding Townships that Project (Table 2). There is good potential for fossil remains from the Horseshoe Canyon in the Edmonton area as indicated by recent finds such as the Danek bonebed (discovered 1988, located within the city of Edmonton, containing bones of *Edmontosaurus* and *Saurolophus*, as well as the teeth of *Albertosaurus*, *Daspletosaurus*, and *Troodon formosus*), and *Edmontosaurus* and *Albertosaurus* found at Quesnell Crescent in northwest Edmonton (e.g., Landry, 2010) while constructing a sewer tunnel. Hadrosaur remains have been found in close proximity to the proposed project area (11 & 15)-52-25W4; Table 2). An ammonite was also recovered nearby (36-52-25W4) In addition, the plant macrofossils *Metasequoia* and *Cercidiphyllum* (Provincial Museum of Alberta, 1980) have been identified from the North Saskatchewan River Valley.

Known Cretaceous fossil localities located in close proximity to the proposed Project are listed in Table 2. In addition, a search of the Royal Tyrrell's online database reveals specimens that have been collected from nearby Cretaceous palaeo locales (Table 3).

Table 2: Known Local Fossil Localities

Location	Age	Locale Name	HRV
13-22-52-24W4	Cretaceous	Mill Creek Ravine	4
16-36-52-25W4	Cretaceous	Edmonton Palaeo Locale Horseshoe Canyon Formation	4
(5,12)-7-52-27W4 (8,8)-12-52-28W4	Cretaceous	Atim Creek	4
2-5-53-24W4	Cretaceous	Edmonton Palaeo Locale	4

Table 3: Local Fossils in RTMP Collections:

Location	Age	Locality Name	Resources
11-52-25W4	Cretaceous	North Saskatchewan River	1965.003.0001-.0088 Hadrosaur
15-52-25W4	Cretaceous	North Saskatchewan River	1971.069.0001-.0002 Hadrosaur
36-52-25W4	Cretaceous	Ramsey Ravine	1971.011.0001 - Ammonoid
29-53-23W4	Cretaceous	Oldman Creek	1996.024.0001 – Hadrosaur track
36-51-25W4	Cretaceous	Rabbit Hill	1976.003.0001-.0002 Amber
25-51-25W4	Cretaceous	Edmonton	1984.163.0023 – Tyrannosaur tooth

Evaluation:

The proposed City of Edmonton – Mill Creek Trestle Bridge (B034) Replacement Project is located on the Mill Creek Ravine in south central Edmonton. There are palaeontological HRVs of 5 assigned to the LSDs affected by the proposed project, associated with both Quaternary river terrace deposits and the Cretaceous Horseshoe Canyon Formation. The Project is primarily located on the floodplain consisting of potentially early Holocene to recent river terraces and the recent alluvial sand and gravel of North Saskatchewan River flood plain.

The bedrock geology along the proposed Project consists of Cretaceous Horseshoe Canyon Formation (Figure 1). This Formation has produced several important palaeontological localities in proximity to the Project, producing both vertebrate (hadrosaur) and invertebrate (an ammonoid) remains. These localities are associated with exposures along the North Saskatchewan valley walls and the valley walls of its tributaries, however if deep excavation is on foundations, pilings or sewer mains is performed, the bedrock will likely be impacted.

Surficial geology on proposed Project consists of potentially early Holocene to Recent alluvial river terraces comprised of gravel, sand and silt. Quaternary palaeontological localities have produced mega faunal fossils including bison, horse, mammoth and muskoxen. Older deposits are preserved as elevated terraces, or remnant terraces perched on the valley walls. The proposed Project will potentially impact both the upper and lower river terraces.

Recommendations:

Further palaeontological work is recommended for this project. Potential impact to Cretaceous paleontological resources related to the Mill Creek Trestle Bridge Replacement Project is high. A known Cretaceous palaeo locale (Mill Creek Ravine; Table 2) is known from the Project area. Cretaceous bedrock of the Horseshoe Canyon Formation with high palaeontological potential will likely be impacted during foundation

repair or during bridge replacement. Satellite imagery and photography indicates the presence of several erosional cliffs with likely bedrock exposures along the of Mill Creek Ravine and the presence of preserved river terrace deposits.

It is therefore recommended that a palaeontological HRIA be conducted prior to the initiation of the Project in order to determine if fossil resources are present or potentially present, and to what extent these resources would be impacted. Once bridge replacement and slope rehabilitation plans are finalized, the impacts associated with construction better understood, final recommendations will be made.

(Recommendations regarding paleontological resources must be made by a professional palaeontologist.)

Recommendations made by:

Paul McNeil, Ph.D.
Steppe Consulting Inc.

References:

Bayrock, L.A., 1972. Surface Geology Edmonton NTS 83H. ERCB/AGS, Map **143**.

Burns, J.A., 2004. Late Pleistocene lemmings (*Lemmus trimucronatus* and *Dicrostonyx groenlandicus*; Muridae: Rodentia) from Alberta, Canada. Journal of Mammalogy **85**(3): 379-383.

Burns, J.A., and Young, R.R., 1994. Pleistocene mammals of the Edmonton area, Alberta. Part I. The carnivores. Canadian Journal of Earth Sciences **31**: 393–400.

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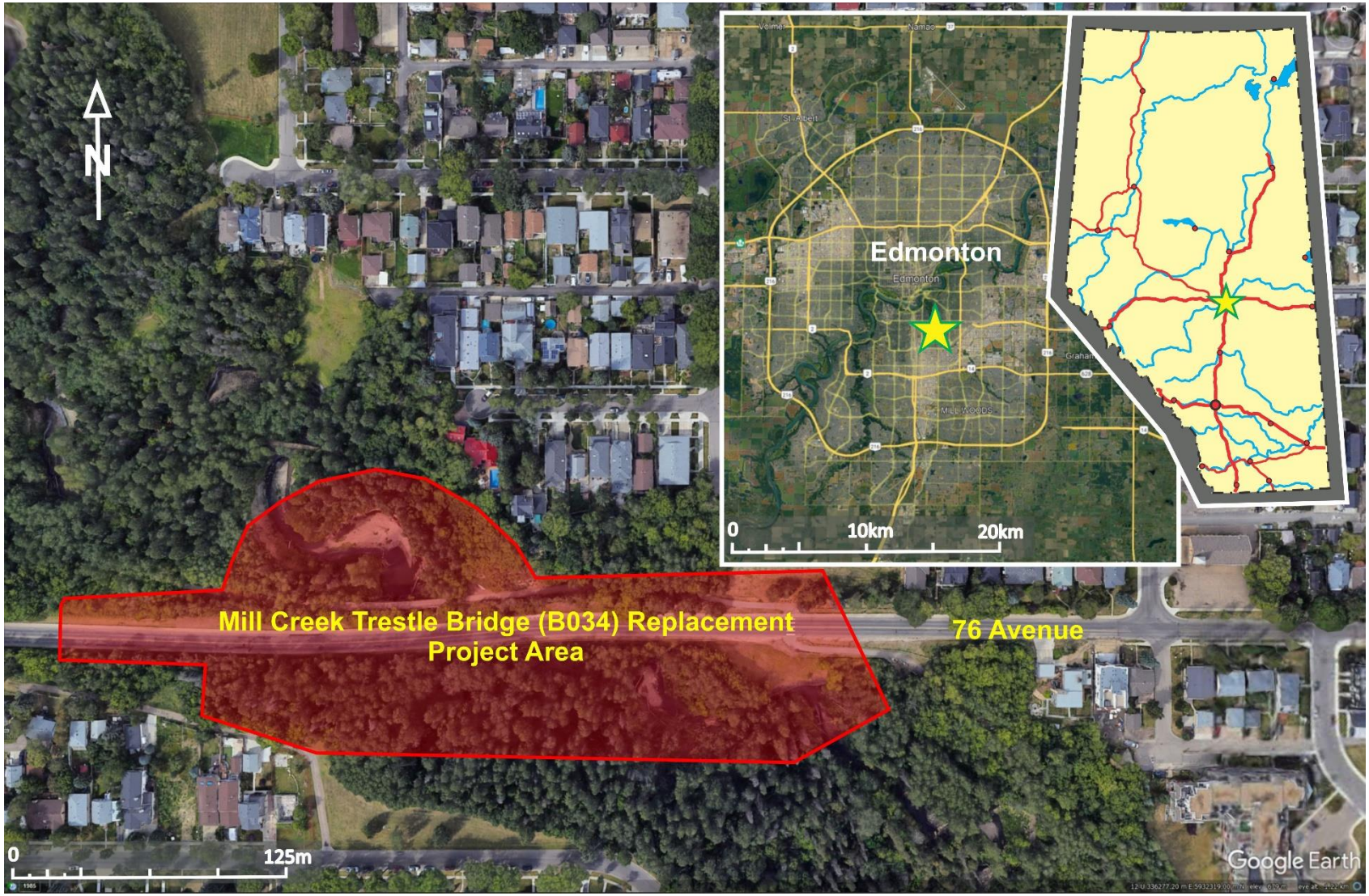


Figure 1: Location of the Mill Creek Trestle Bridge (B034) Replacement Project. Modified from Google Earth (2023).

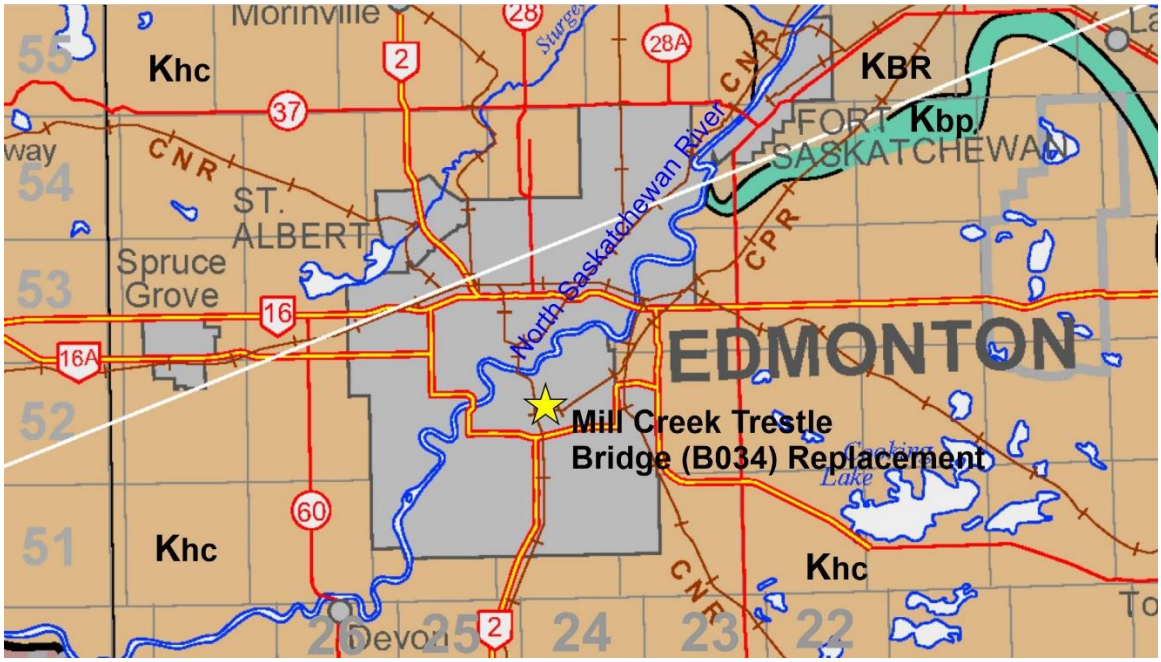


Figure 2: Location and bedrock geology of the proposed Mill Creek Bridges (B029, B032, B033, B198, B200) – Bridge Replacements and Repair. Acronyms include: KBR – Cretaceous Belly River Formation; Kbp – Cretaceous Bearpaw Formation; and Khc- Cretaceous Horseshoe Canyon Formation. Modified from Hamilton *et al*. (1999).

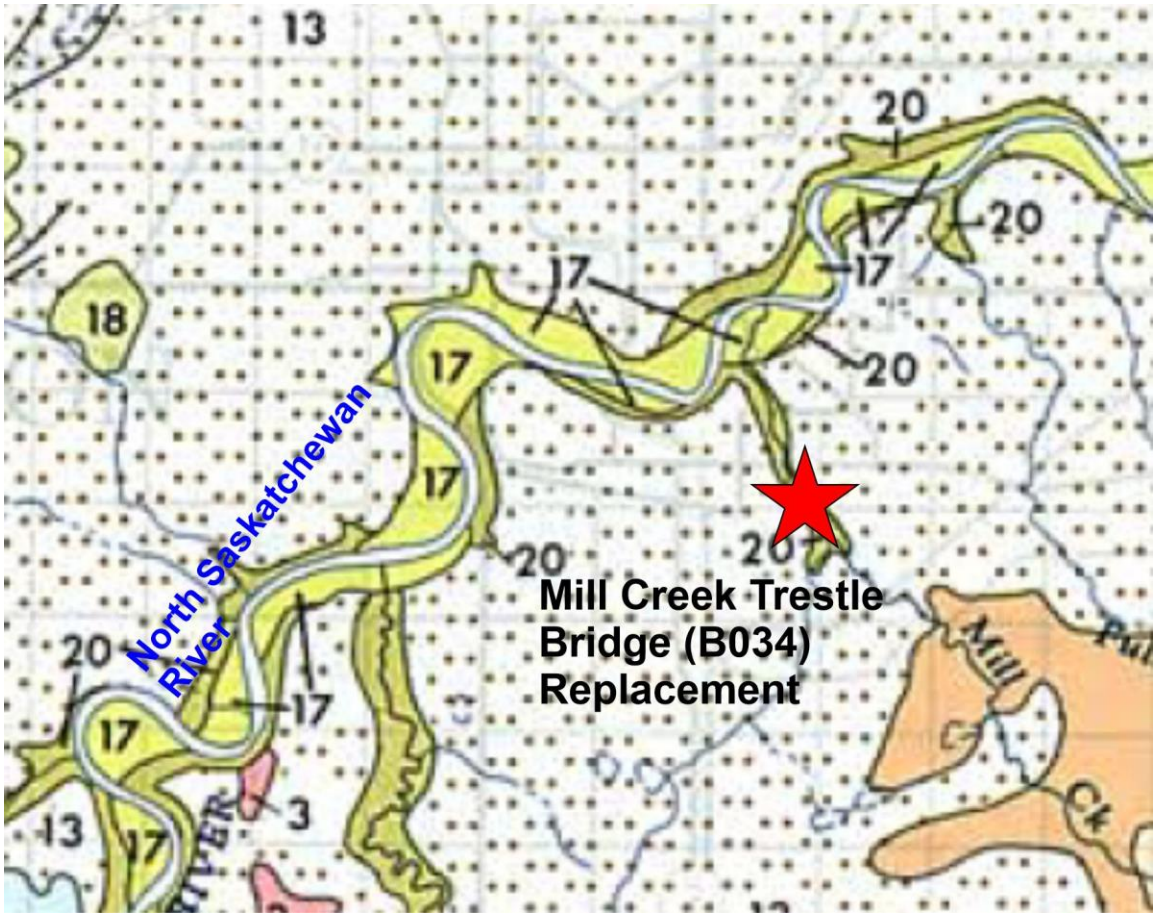


Figure 3: Mill Creek Trestle Bridge (B034) Replacement Project surficial geology. Surficial geological acronyms include: 3 – kame, esker, sand and gravel; 13 – glacio lacustrine silt and clay with minor sand; 17 – alluvial river terrace deposits, and; 20 – erosional colluvium. Modified from Bayrock (1972).

Figure 4: Mill Creek immediately north of the trestle bridge, showing the area recommended for rehabilitation and stabilization of the cut bank. Note the presence of preserved bedded river terrace deposits in the cut bank. From Law and Tweedie (2022).

Appendix G

Satellite Imagery

Plate 1 Google Earth Imagery (4/30/2002).

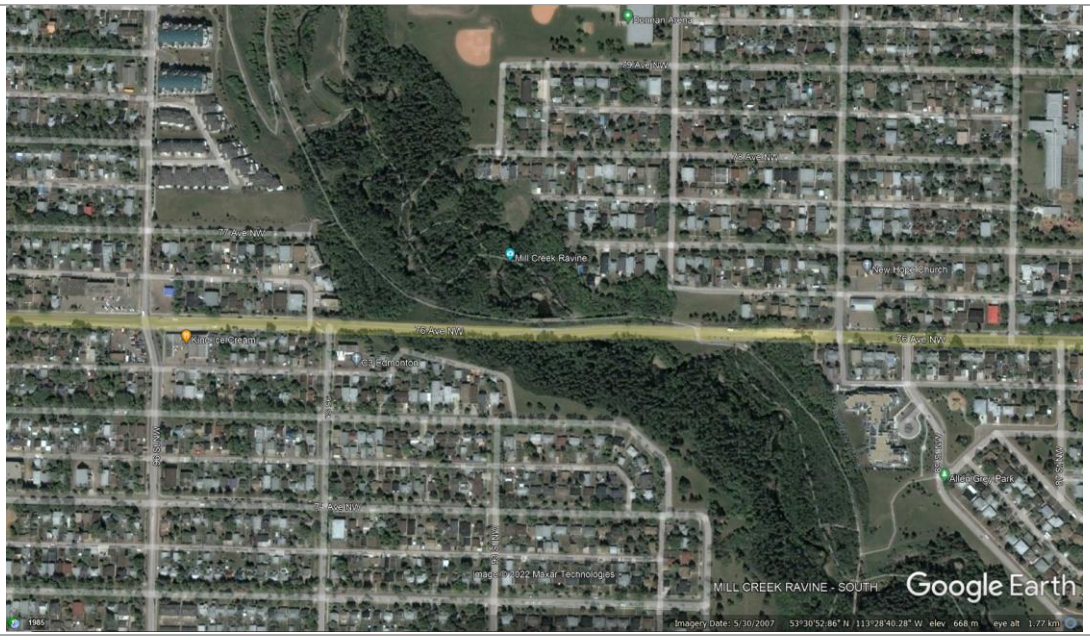


Plate 2 Google Earth Imagery (5/30/2007).

Plate 3 Google Earth Imagery (8/1/2011).

Plate 4 Google Earth Imagery (9/29/2015).

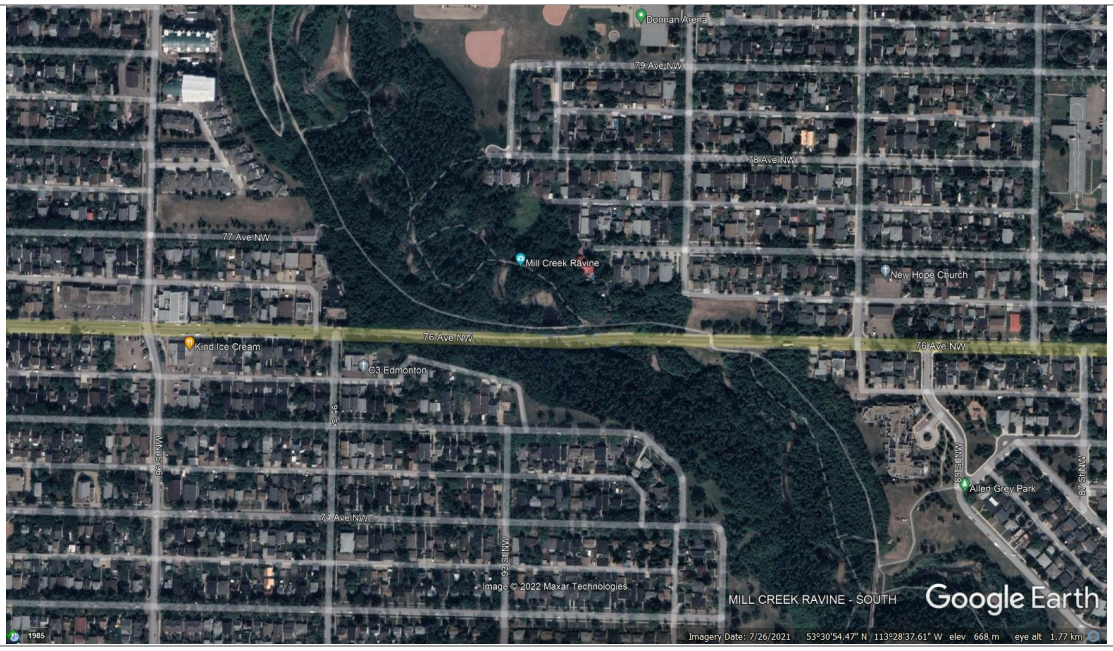


Plate 5 Google Earth Imagery (7/26/2021).

Plate 6 Google Earth Imagery (1/7/2022).

Plate 7: Aerial imagery from 1952

Plate 8: Aerial imagery from 1969

Plate 9: Aerial imagery from 1982

Appendix H

Field Photographs

Plate 1 View of potential temporary workspace at 77 Ave (October 5, 2022, UTM:335956E/ 5932238N)

Plate 2 View of potential temporary workspace north of 76 Ave, west of trestle bridge (October 5, 2022, UTM:336156E/ 5932106N)

Plate 3 View of trestle bridge (October 5, 2022, UTM:336219E/ 5932102N)

Plate 4 View of trestle bridge (October 5, 2022, UTM: 336225E/ 5932099N)

Plate 5 View of potential temporary workspace north of 76 Ave, east of trestle bridge (October 5, 2022 UTM: 336420E/ 5932099N)

Plate 6 View of trestle bridge and outfall (October 5, 2022, UTM: 336247E/ 5932127N)

Plate 7 View of trestle bridge and outfall (October 5, 2022; UTM: 336234E/ 5932159N)

Plate 8 View of outfall on south side of 76 Ave (October 5, 2022; UTM: 336298E/ 5932076N)

Plate 9 View of white cockle (October 5, 2022; UTM: 336217E/ 5932145N)

Plate 10 View of Canada thistle (October 5, 2022; UTM: 336342E/ 5932100N)

Plate 11 View of common tansy (October 5, 2022; UTM: 336360E/ 5932069N)

Plate 12 View of garlic mustard (June 1, 2023; UTM: 336288E/ 5932097N)

Plate 13 View of SW4 community (October 5, 2022; UTM: 336344E/ 5932066N)

Plate 14 View of PB3 community (October 5, 2022; UTM: 336223/ 5932130N)

Plate 15 View of riparian wildlife habitat (September 27, 2022; UTM: 336060E/ 5932598N)

Plate 16 View of mature conifer and walkways (September 27, 2022; UTM: 336023E/ 5932622N)

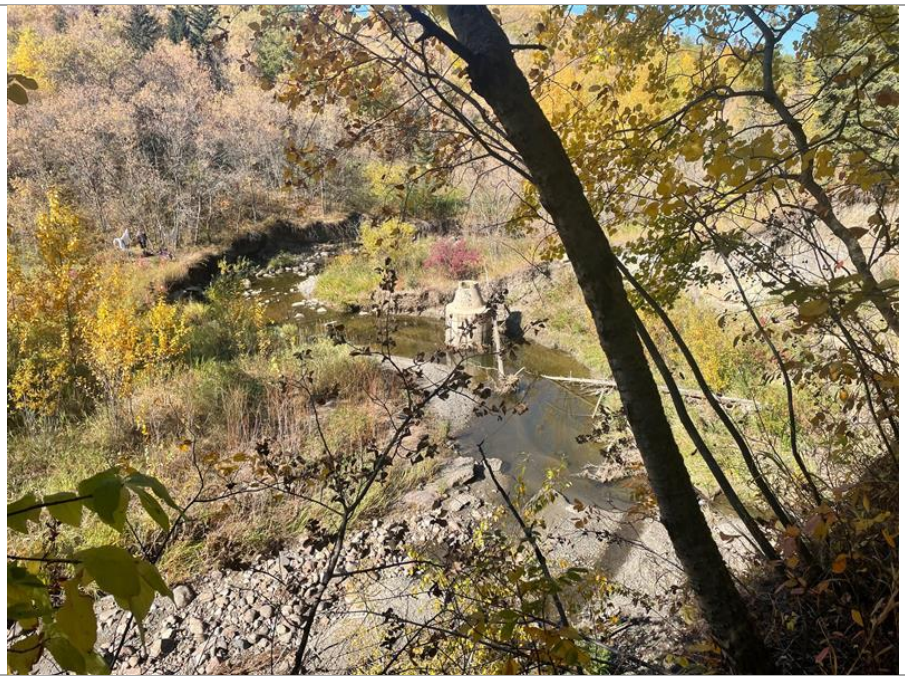


Plate 17 View of riparian wildlife habitat (September 27, 2022; UTM: 336876E/ 5932478N)

Plate 18 View of immature mixed wood stand (September 27, 2022; UTM: 336252E/ 5932247N)

Plate 19 View of stick nest, likely crow or raven (September 27, 2022; UTM: 336125/ 5932747)

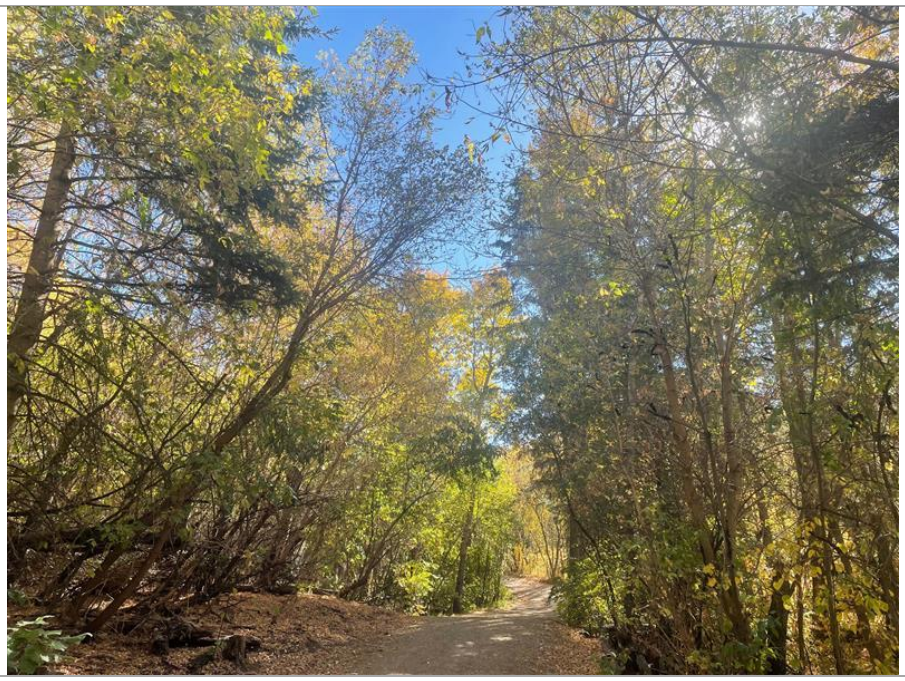


Plate 20 View of immature mixed wood stand (September 27, 2022; UTM: 336292E/ 5931035N)

Photo 21 : View downstream into existing culvert under 76 Avenue (October 20, 2022, UTM 336287E/5932072N).

Photo 22: View downstream towards existing culvert under 76 Avenue (October 20, 2022, UTM 336341E/ 5932071N).

Photo 23: View across Mill Creek, upstream of culvert (October 20, 2022, UTM 336341E/5932071N)..

Photo 24: View upstream of Mill Creek, upstream of culvert (October 20, 2022, UTM 336341E/5932071N)..

Photo 25: View towards trestle bridge, from 76 Avenue (October 20, 2022, UTM 336246E/5932099N).

Photo 26: View downstream from trestle bridge, showing large scour pool downstream of culvert (October 20, 2022, UTM 336237E/5932111N).

Photo 27: View downstream from trestle bridge, showing significant bank instability (October 20, 2022, UTM 336237E/5932111N).

Photo 28: View across from right downstream bank, showing scour pool (October 20, 2022, UTM 336255E/5932118N).

Photo 29: View showing downstream pedestiran bridge, with significant armoring and run habitat (October 20, 2022, UTM 336200E/5932182N).

Photo 30: View upstream from pedestiran bridge, with significant armoring and riffle habitat (October 20, 2022, UTM 336200E/5932182N).

Photo 31: View of gravel bar downstream of trestle bridge and bank instability. (October 20, 2022, UTM 336229E/5932150N).

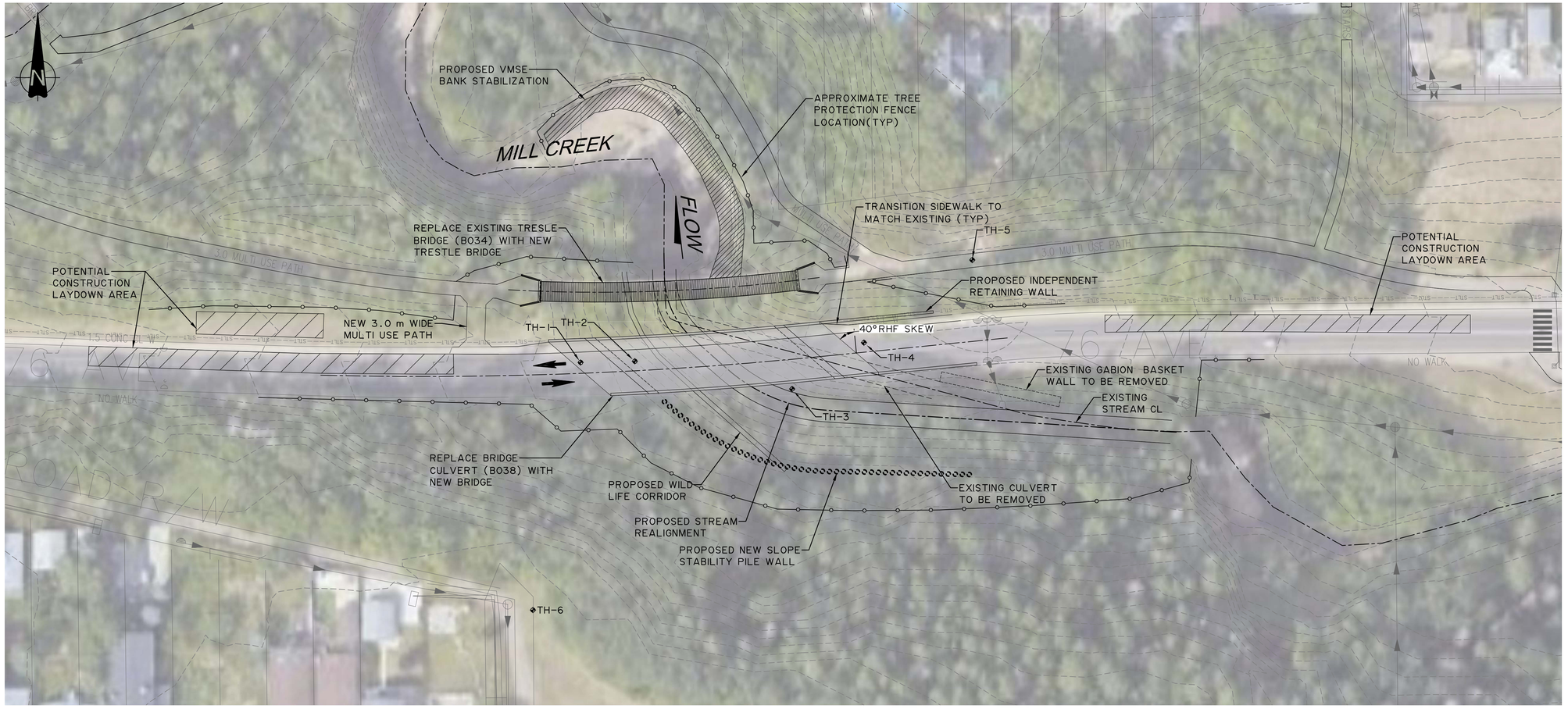
Photo 32: View of scour pool below culvert (October 20, 2022, UTM 336249E/5932126N).

Photo 33: View of rffle habitat downstream of scour pool (October 20, 2022, UTM 336229E/5932150N).

Photo 34: View of armored bank, downstream of pedestrian bridge, approximately 150 m downstream of trestle bridge (October 20, 2022, UTM 336207E/5932214N).

Appendix I

Project Drawings



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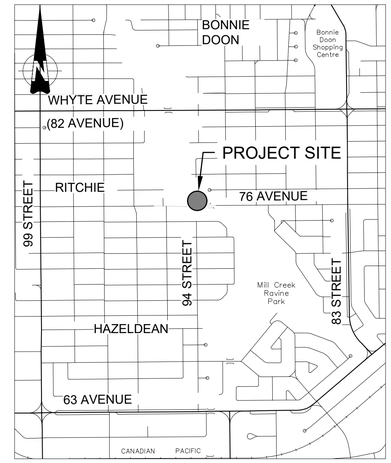

SITE MAP
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EXISTING UTILITY LEGEND

DESCRIPTION	SYMBOL	
ABANDONED UTILITIES	ABD	
DRAINAGE	STORM	---ST---
	SAN	---SAN---
	COMB	-·-COMB-·-
GAS LINES	HP	-·-HP-·-
	IP	·-·-IP-·-·
	MP	---MP---
	LP	·--LP--·-
POWER DUCTLINE		---PD---
POWER POLES OVERHEAD		---O/H---
POWER CABLE		---PC---
POWER LINE		--PWR--
STREETLIGHT CABLE		--STLT--
STREETLIGHT POLES		
TELEPHONE DUCTLINE		---TD---
TELE. BURIED CABLE		---TC---
OIL PIPELINE		---OIL---
URD TRENCH		· · ·
UNDERGROUND CABLE/ FIBER OPTIC CABLE	SHAW	---SHAW---
	ALL STREAM	---ALLSTR---
	BELL	---BELL---
WATERMAIN		---WAT---

EX SURFACE UTILITY LEGEND

- POWER POLE
- STREET LIGHT POLE
- POWER BASE POLE
- POWER CUBICLE
- POWER MANHOLE
- POLE ANCHOR
- TELEPHONE POLE
- TELEPHONE MANHOLE
- SANITARY MANHOLE
- STORM MANHOLE
- CATCH BASIN MANHOLE
- CATCH BASIN
- FIRE HYDRANT
- WATER VALVE
- WATER TEE
- ANODE
- SHAW PEDESTAL

SHEET	DESCRIPTION	DWG NO
5	PROPOSED PEDESTRIAN BRIDGE REPLACEMENT (B034)	MICR P231 S05
4	STREAM REALIGNMENT AND SLOPE STABILITY PILE WALL	MICR P231 S04
3	BANK STABILIZATION	MICR P231 S03
2	PROPOSED 76 AVE BRIDGE REPLACEMENT (B038)	MICR P231 S02
1	SITE PLAN AND DRAWING INDEX	MICR P231 S01

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GEORGE KALAMOUTSOS
ID 66820
31 Oct. 2024

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BRIDGE B034 & B038
SITE PLAN AND DRAWING INDEX

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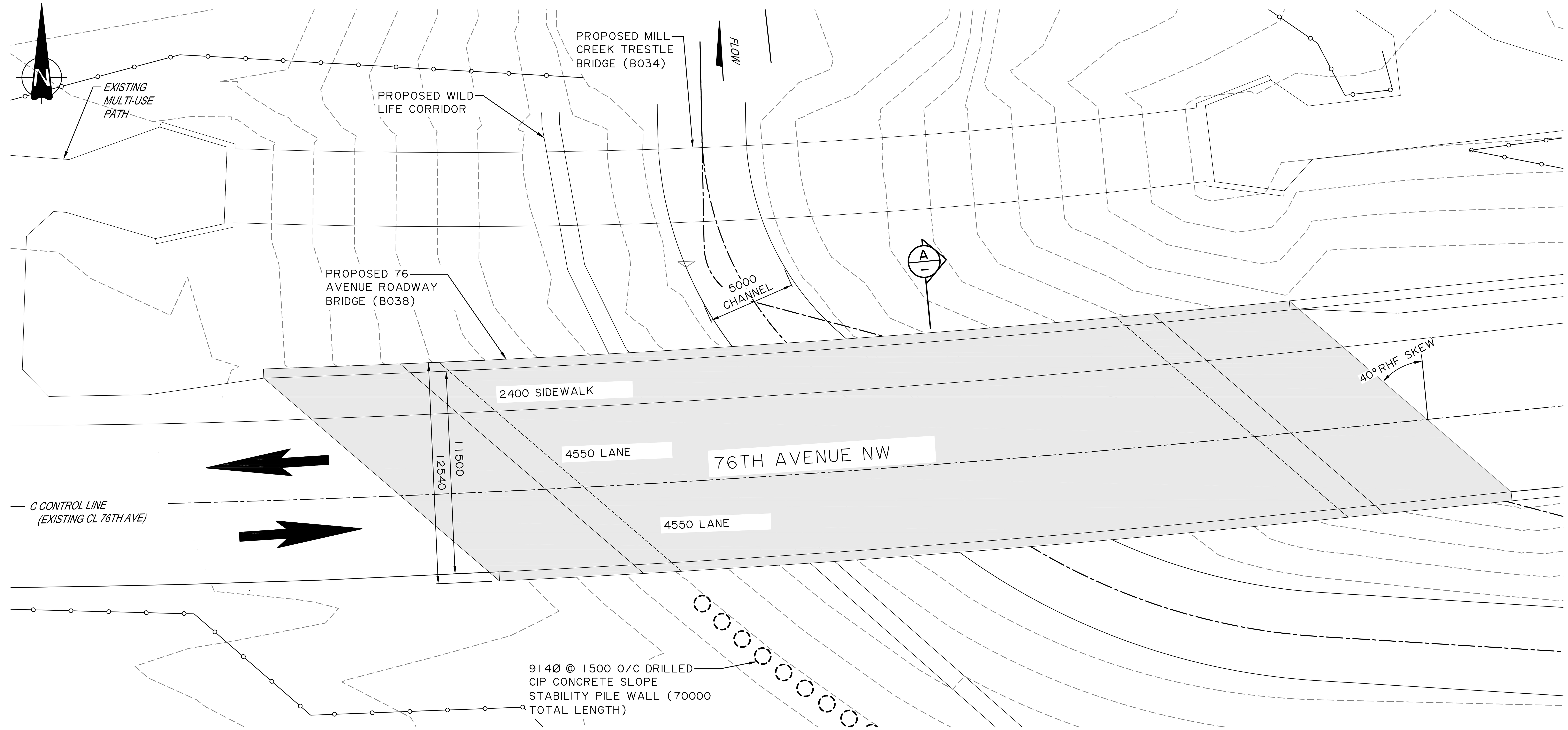
MICR P231 S01



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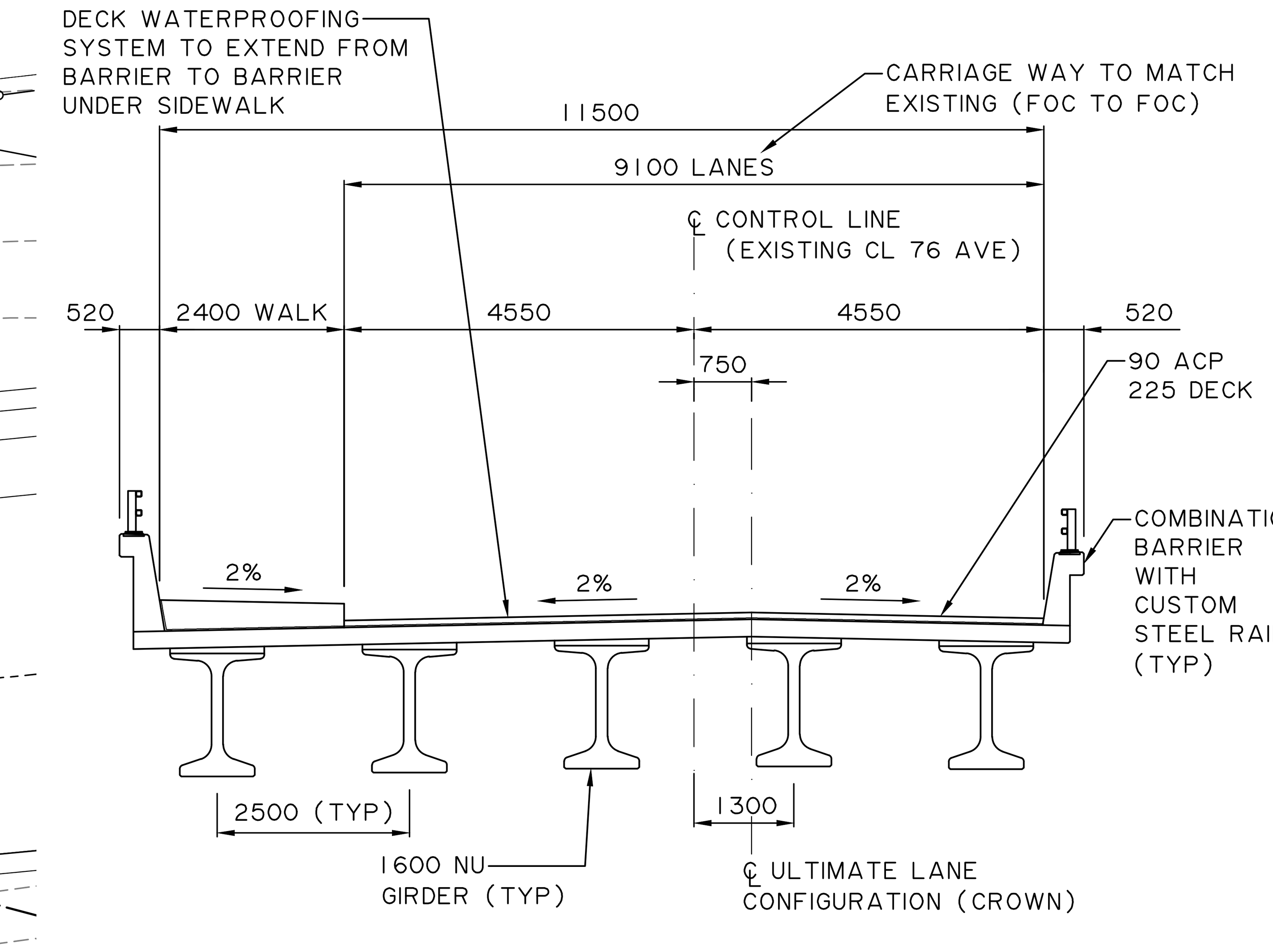
INTERIM STAGE SHOWN 1:150



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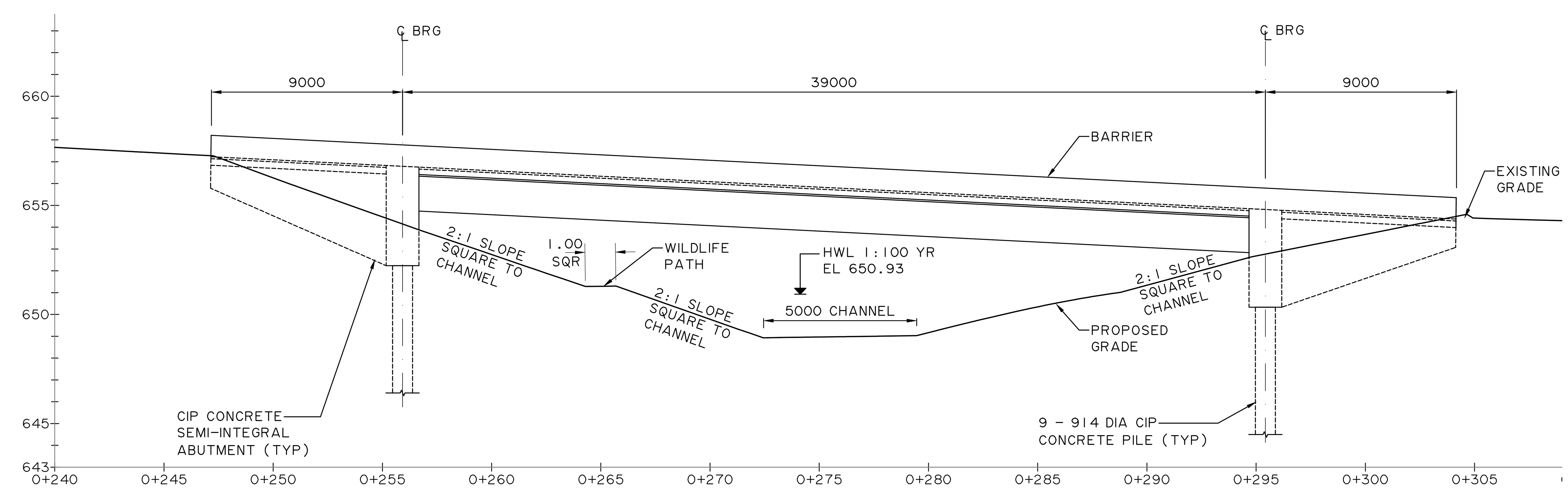

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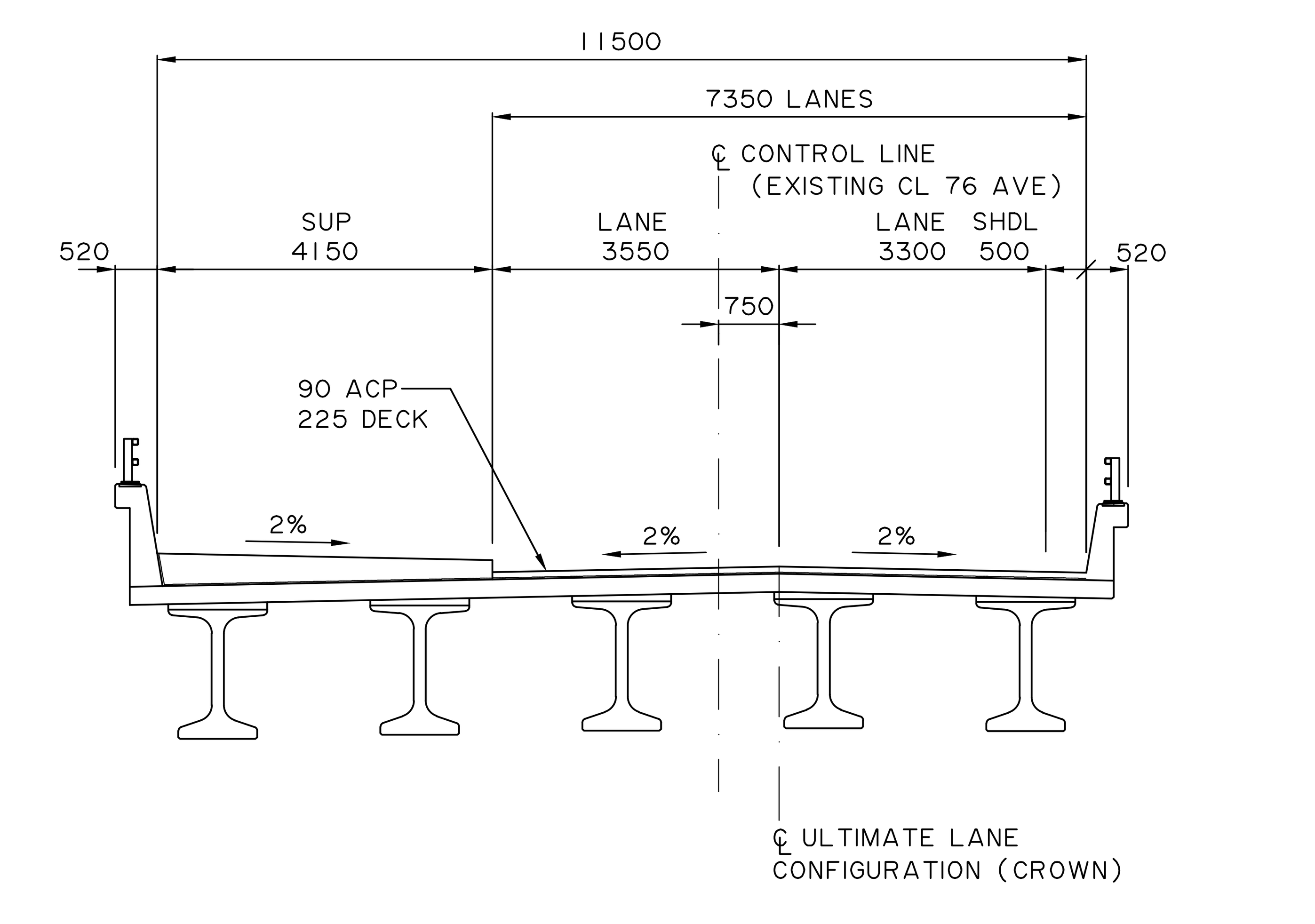

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MILL CREEK TRESTLE BRIDGE
BRIDGE B034 & B038
PROPOSED 76 AVE BRIDGE REPLACEMENT (B038)

DRAWING

MICR P231 S02

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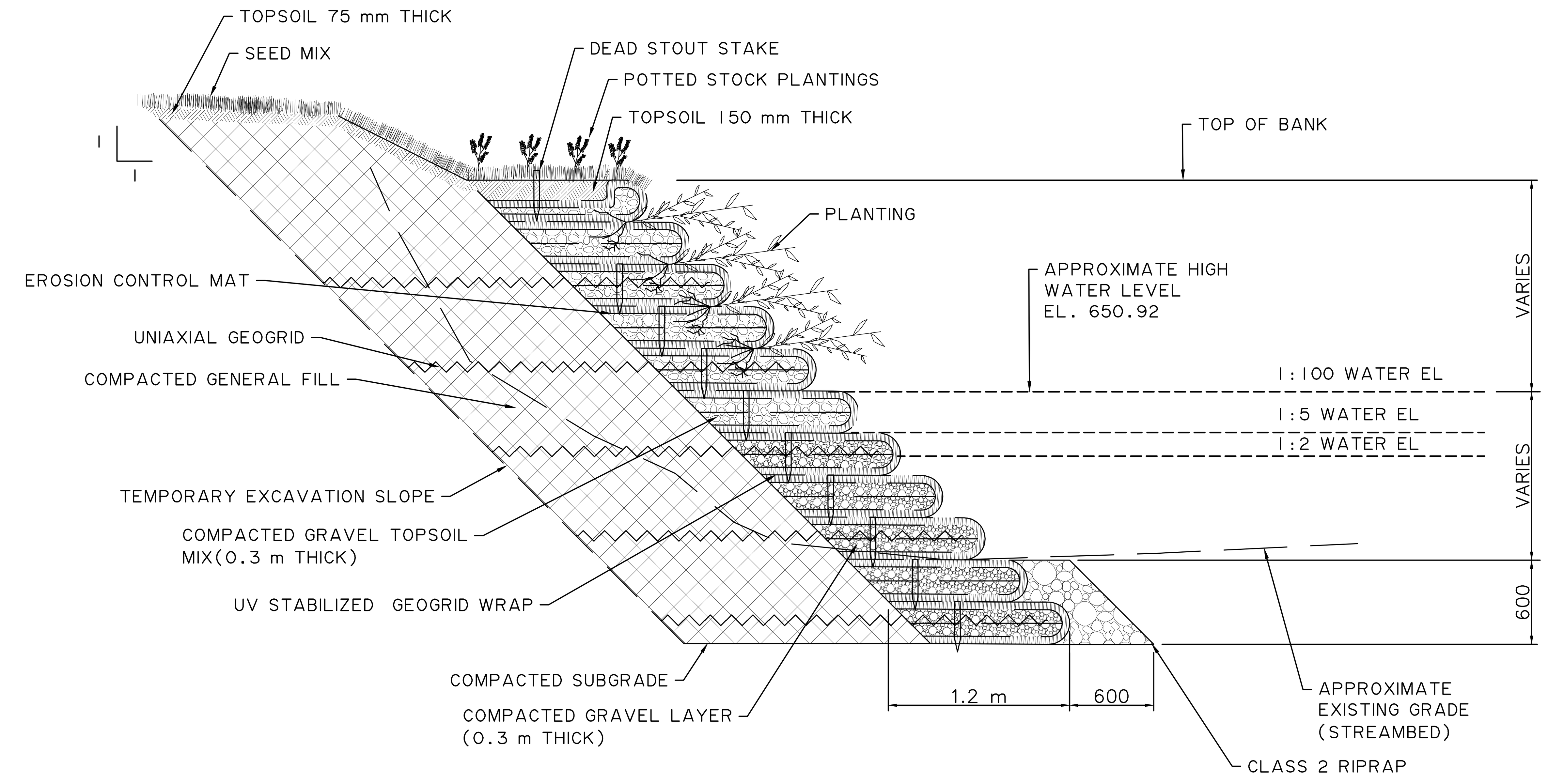

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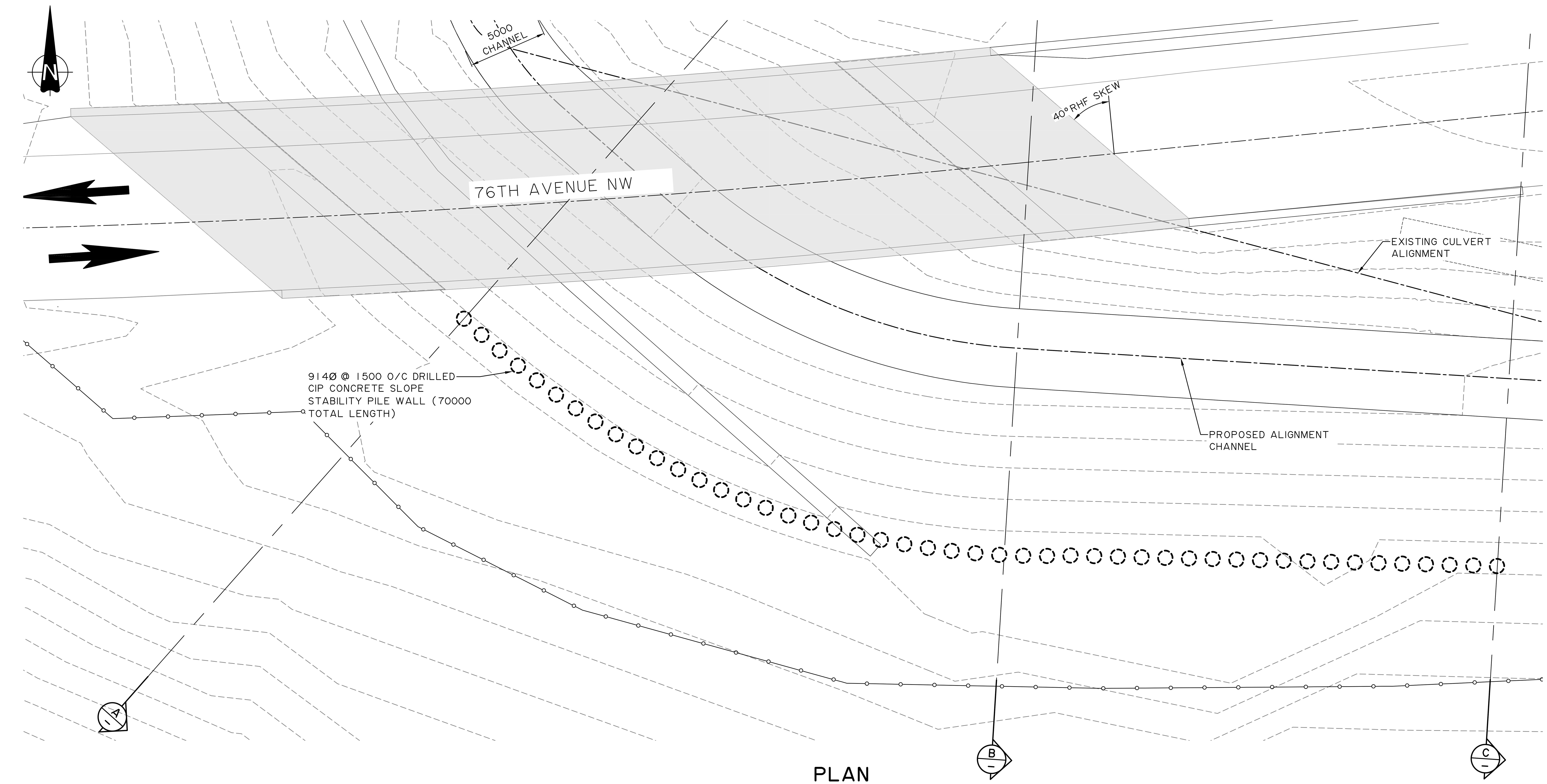

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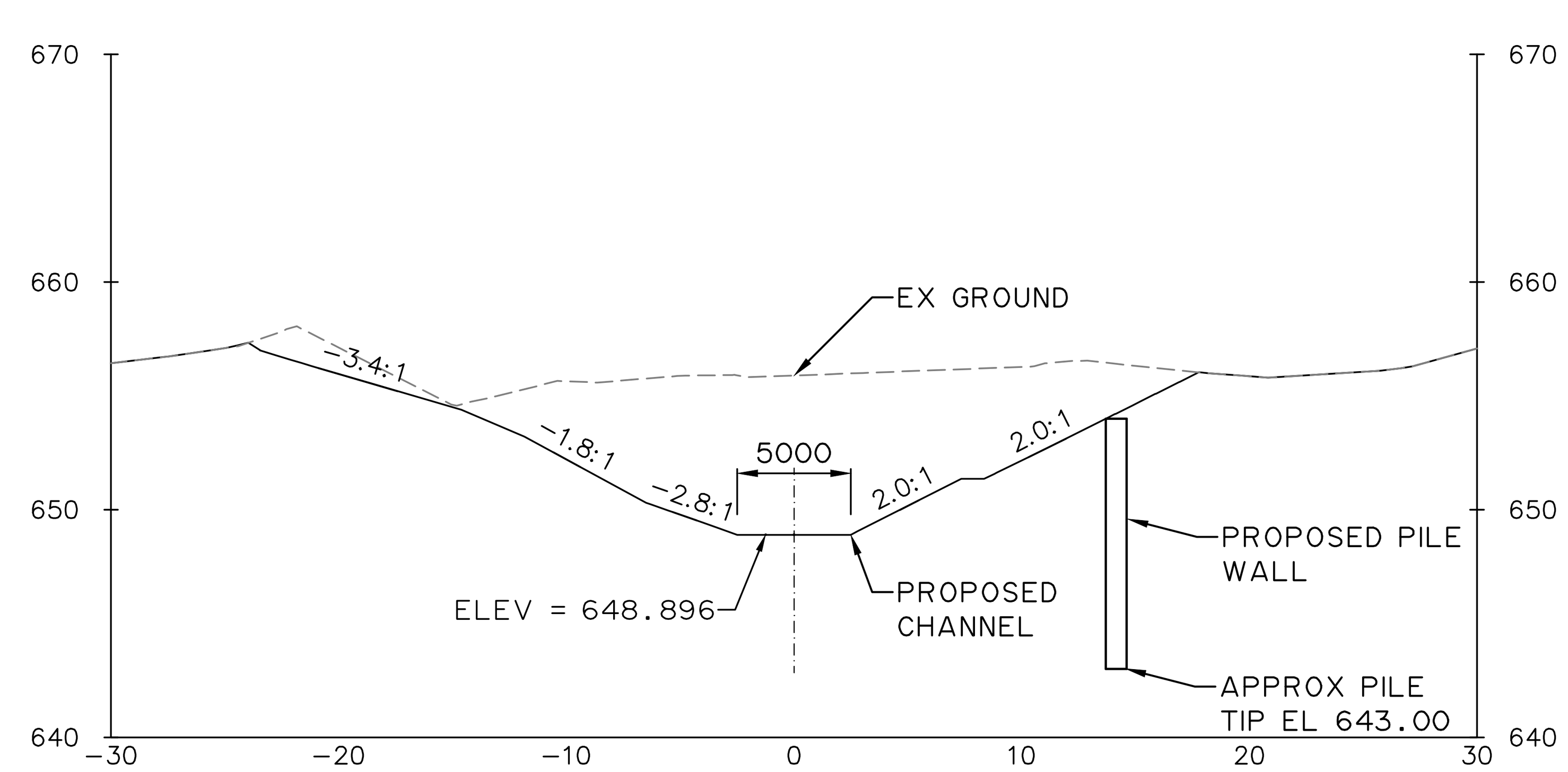

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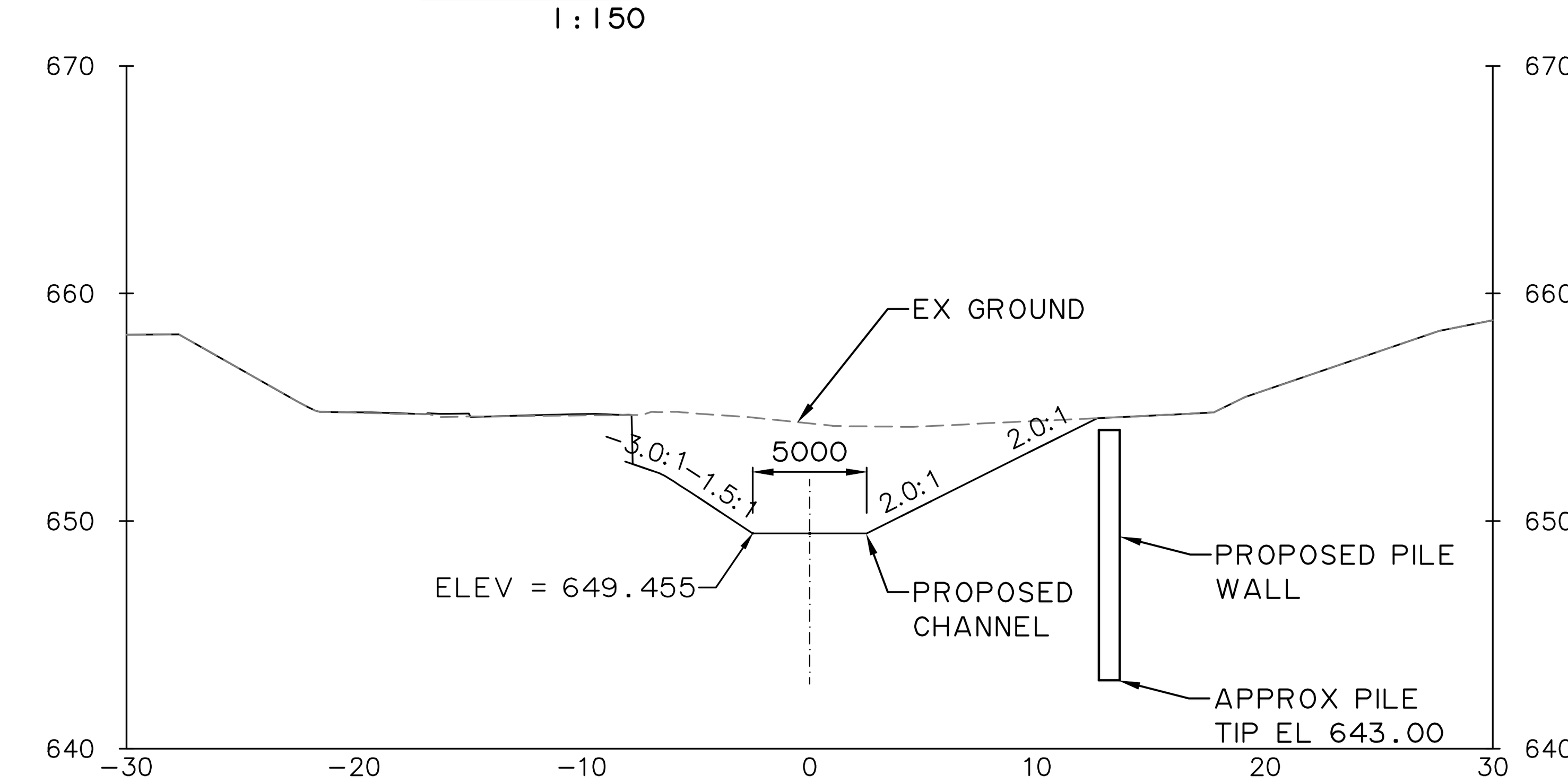

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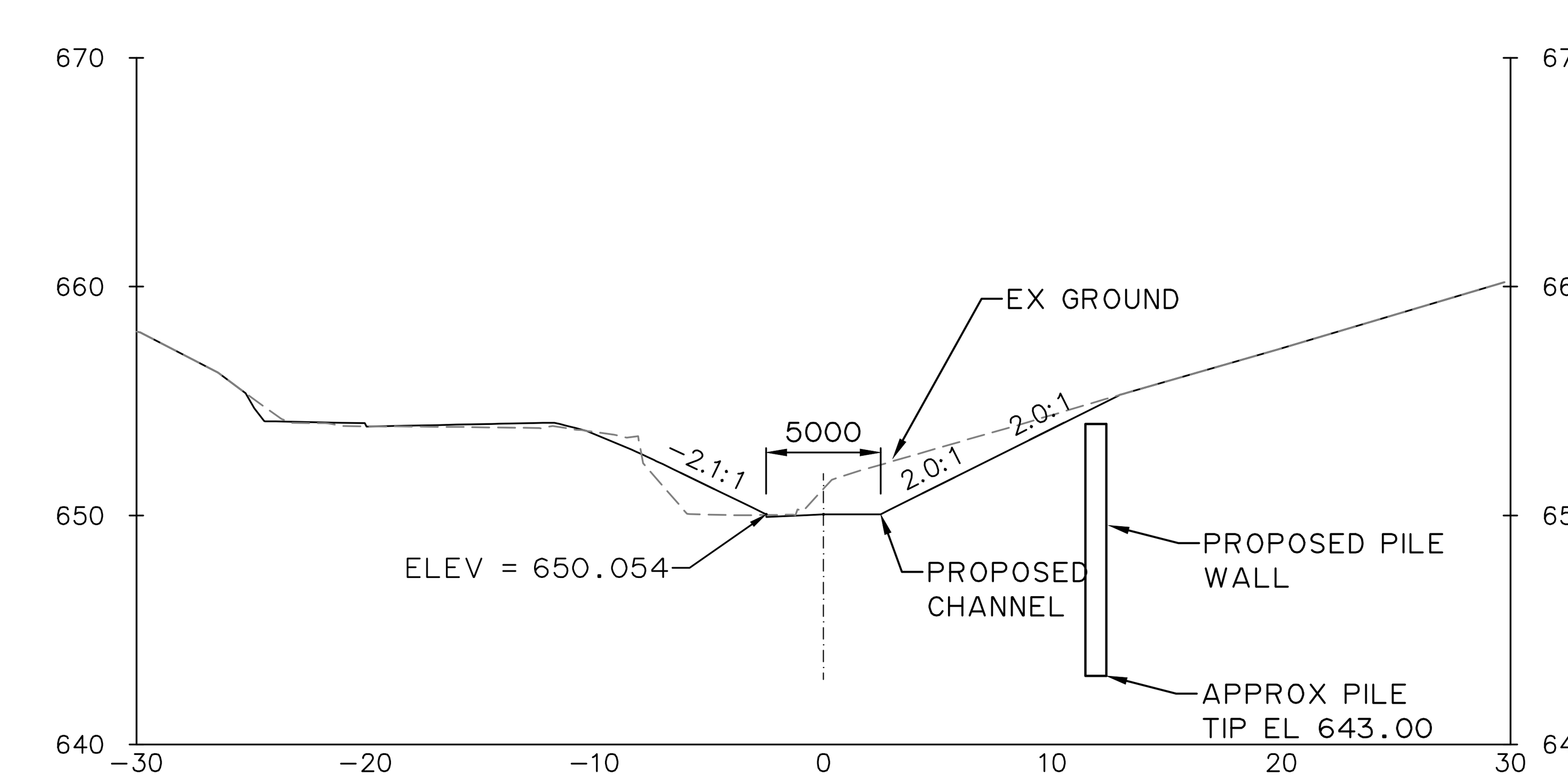

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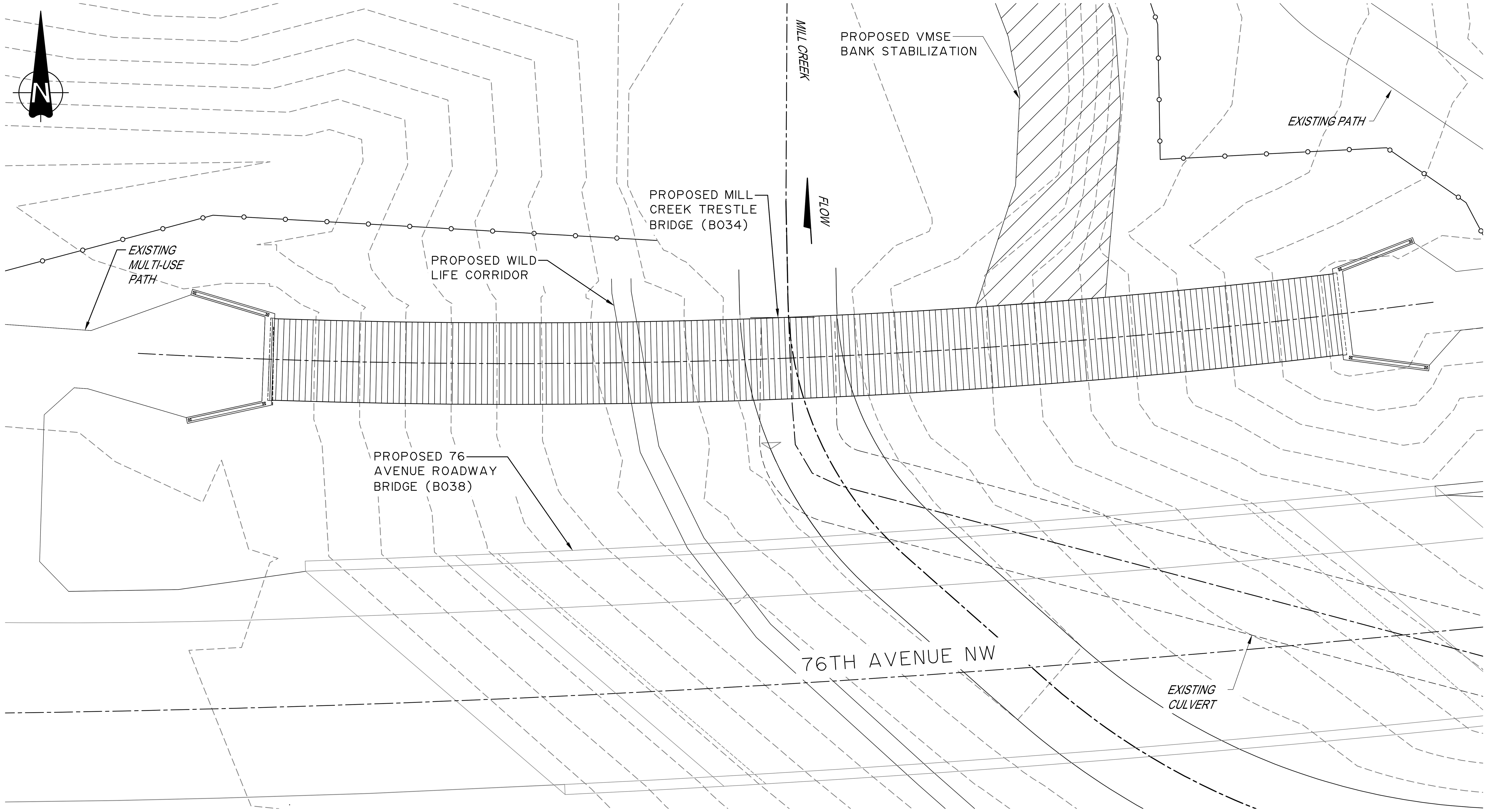

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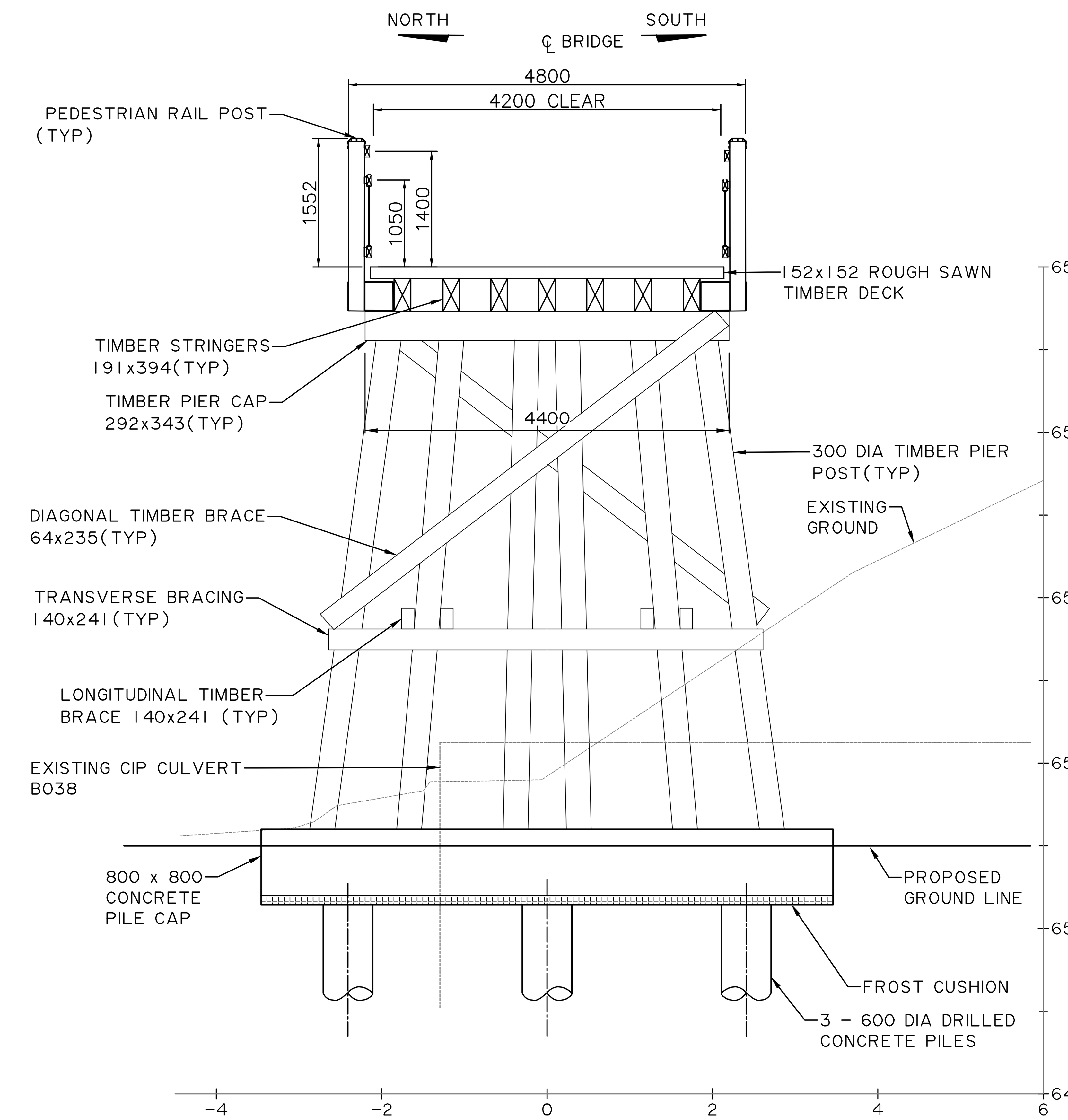

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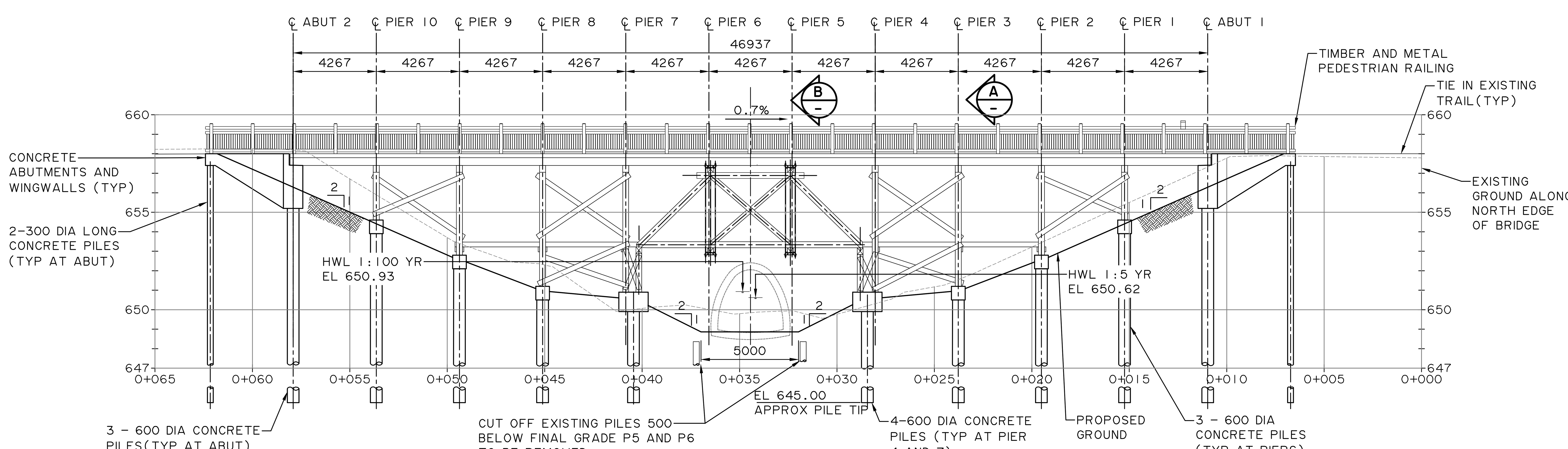

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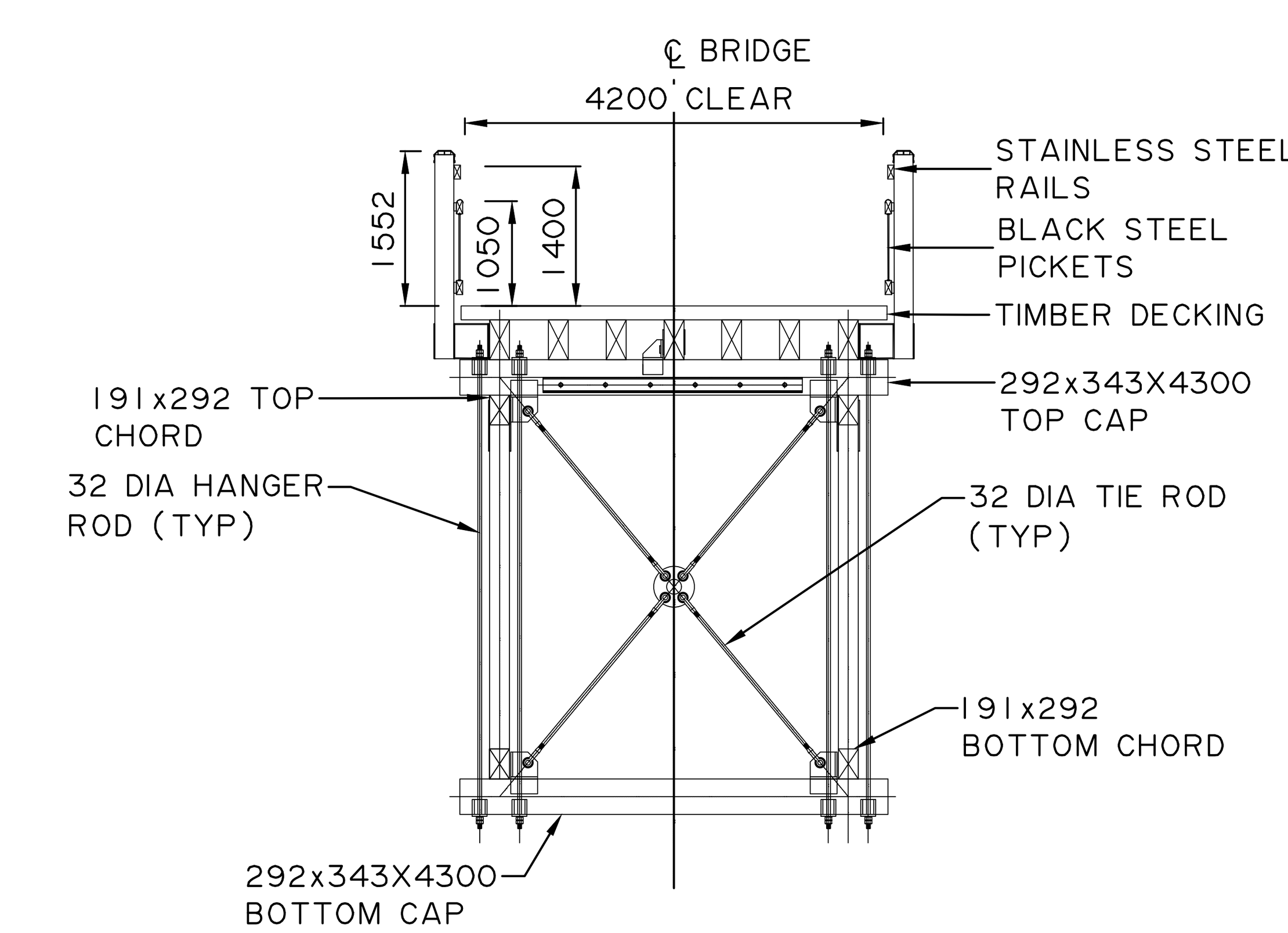

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