



The City of Calgary

Canadian Environmental Assessment Agency Summary of a Project Description

Green Line Maintenance and Storage Facility

8 February 2019

307074-02081-800 – EN-REP-0001

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List of Acronyms

Acronym	Definition
AAAQO	Alberta Ambient Air Quality Objectives
ABMI	Alberta Biodiversity Monitoring Institute
ABWRET-A	Alberta Wetland Rapid Evaluation Tool-Actual
AEP	Alberta Environment and Parks
AGRASID	Agricultural Region of Alberta Soil Inventory Database
APTA	American Public Transportation Association
ASIC	Alberta Soil Information Centre
BIA	Biophysical Impact Assessment
CAC	Criteria Air Contaminants
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Agency
CEAA 2012	<i>Canadian Environmental Assessment Act, 2012</i>
CO	Carbon Monoxide
CO ₂ e	Carbon Dioxide Equivalent
CRAZ	Calgary Region Air Zone
dBA	Decibels
DC	Direct Control
EC	Electrical Conductivity
ECCC	Environment and Climate Change Canada
ECO	Environmental Construction Operations
EIA	Environmental Impact Assessment
EPEA	<i>Environmental Protection and Enhancement Act</i>

Acronym	Definition
GHG	Greenhouse Gas
Green Line	Green Line Light Rail Transit Project
GreenTRIP	Green Transit Incentives Program
HC	Hydrocarbon
HRIA	Historical Resources Impact Assessment
HRV	Historical Resource Value
kt/a	kilotonnes per year
LEED	Leadership in Energy and Environmental Design
LRT	Light Rail Transit
LRU	Line Replaceable Unit
LRV	Light Rail Vehicle
masl	Metres Above Sea Level
MBCA	<i>Migratory Birds Convention Act, 1994</i>
mbgs	Metres Below Ground Surface
MGA	<i>Municipal Government Act</i>
NFPA	National Fire Protection Association
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
O ₃	Ozone
OCS	Overhead Catenary System
pHRIA	Paleontological Historical Resources Impact Assessment
PM _{2.5}	Particulate Matter Less Than 2.5 Microns (μ) in Diameter
PM ₁₀	Particulate Matter Less Than 10 μ in Diameter



Acronym	Definition
PNSA	Preliminary Natural Site Assessment
PPM	Planned Preventative Maintenance
PTIF	Public Transit Infrastructure Fund
PVC	Polyvinyl Chloride
ROW	Right-of-way
SARA	<i>Species at Risk Act</i>
S-CRI	Special Purpose – City and Regional Infrastructure
SO ₂	Sulfur Dioxide
TCRP	Transit Cooperative Research Program
TSP	Total Suspended Particulates
US EPA	United States Environmental Protection Agency
VDE	Vehicle Dynamic Envelope
WAIR	Wetland Assessment and Impact Report

1. General Information and Contacts

1.1 Project Name, Nature and Proposed Location

The City of Calgary plans to construct, own and operate the Green Line Maintenance and Storage Facility (the Project) in Calgary, Alberta. Figure 1 shows the Project location as related to the proposed associated Green Line Light Rail Transit (LRT) Project (referred to as the Green Line). Figure 2 indicates that the Project will be situated within an area directly adjacent to industrial operations and within an area that is generally commercial and industrial in nature. Figure 3 shows the Project location relative to provincial and international boundaries. Figure 4 shows the proposed Project layout. Figure 5 shows the location of federal lands relative to the Project.

The proposed development location is currently on vacant land at 12725 52nd Street SE and the westerly adjacent parcel at 12525 52nd Street SE, Calgary, Alberta within legal subdivisions 1 and 2 of Section 10 Township 23 Range 29 West of the 4th Meridian (1&2-10-23-29-W4M).

The Project will provide the maintenance and storage services for Light Rail Vehicles (LRVs) associated with the Green Line, a new major light rail transit system that will ultimately span the current length of Calgary (north to south). The Maintenance and Storage Facility rail yard component (i.e. the Project) of the Green Line is the only component that meets the definition of a designated physical activity as defined in the *Regulations Designating Physical Activities* (Government of Canada [GoC] 2018a). Since Stage 1 of the Green Line is estimated to be only 20 km it is not considered a designated physical activity, which the Canadian Environmental Assessment Agency (CEAA) has confirmed.

The Project will include 28 sidings with approximately 17.5 kilometres (km) of track. The Project will comprise tracks for heavy and light duty maintenance bays, wash bays, paint bays and equipment testing areas. The entire Project will occupy an area of approximately 226,700 square metres (m²). The City of Calgary has purchased vacant land within a commercial and industrial area of Calgary for the purpose of constructing the Project (Figure 2).

1.2 Proponent Information

Name of the Proponent: The City of Calgary
Address of the Proponent: P.O. Box 2100, Station Main #211
Proponent: Calgary, AB, T2P 2M5

Chief Executive Officer or Equivalent

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Primary Representative

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1.3 Summary of Parties Engaged to Date

To date, The City of Calgary has conducted public, regulatory and Indigenous Group/Community engagement in relation to the Green Line and the Project.

Between June 8, 2015 and March 2, 2017, The City of Calgary conducted various information sessions, presentations and open houses to communities/neighborhoods near the proposed Green Line, which included the Project (The City of Calgary 2017a).

The City of Calgary also conducted regulatory engagement with Alberta Culture and Tourism, Alberta Environment and Parks (AEP), The City of Calgary and CEAA starting on September 29, 2015 and continuing to present day in relation to the Green Line and the Project.

The Indigenous Group/Community engagement program was conducted in two phases. In 2016, four Indigenous Groups/Communities (Siksika Nation, Tsuut'ina Nation, Blood Tribe and Piikani Nation) were contacted as directed by Alberta Culture and Tourism. The City of Calgary provided notification letters to each Indigenous Group/Community and conducted meetings and site tours/visits of the Green Line, including the Project. The initial phase of engagement concluded with the receipt of letters of non-objection from each of the four Indigenous Groups/Communities. The second phase of Indigenous Group/Community engagement was initiated in 2018 after CEAA provided a list of Indigenous Groups/Communities that may have interest in the proposed Project. The City of Calgary sent information packages to each of the 21 noted Indigenous Groups/Communities and has followed up with meetings and site visits as requested. The second phase of Indigenous Group/Community engagement is ongoing.

The results of the noted engagement activities are included in Sections 6 and 7.

1.4 Requirements Under Other Jurisdictions

1.4.1 Federal Jurisdiction

- The *Rail Safety Act* (GoC 2018c) and Canada's *Transportation of Dangerous Goods Act* (GoC 2018d) apply to passenger railways in Canada. These Acts do not denote approval or environmental investigation requirements for Urban Transit Systems and therefore are not applicable to the Project.
- The *Migratory Birds Convention Act, 1994* ([MBCA]; GoC 1994) requirement to protect migratory birds and their nests will be enforced throughout construction and operation of the Project. The construction,

operation and decommissioning of the Project must not harm migratory birds and must not cause disturbance or destruction of their nests and eggs.

- The *Species at Risk Act* ([SARA]; GoC 2002) indicates that species must not be harmed by the construction, operation, or decommissioning of Project works. It is illegal to kill, harm, harass, capture, or take in any way any species listed under SARA.
- The *Fisheries Act* (GoC 1985) focuses on conservation and protection of fish habitat essential to sustaining freshwater and marine fish species. The construction, operation and decommissioning of the Project must not harm fish that are part of a commercial, recreational or Indigenous Peoples fishery. There are no anticipated impacts to fish or fish habitat as a result of the Project. There are no fisheries or fish habitat on the Project site. A *Fisheries Act* permit is not required for the Project. See Section 5.2.1.1 for additional details.

Excluding the *Rail Safety Act* (not applicable), additional information on how these Acts apply to the Project are discussed in detail in Section 5.

1.4.2 Provincial Requirements

Provincial environmental initiatives in relation to air, land and water mandate that regional management policies and management programs be established to govern development and operation. These regional policies/programs are governed by the *Land Stewardship Act* (Province of Alberta [PoA] 2013), *Water Act* (PoA 2017a), *Alberta Weed Control Act* (PoA 2008) and the *Environmental Protection and Enhancement Act* (EPEA; PoA 2017b) all of which further refine their requirements through regulations, codes of practice, standards, guides or manuals for a very wide variety of Project aspects (waste and recycling management, release reporting, conservation and reclamation, and air, land, water and wastewater management).

- EPEA – Environmental Impact Assessment (EIA)
 - Pursuant to Schedule 1 of the Alberta EPEA *Environmental Assessment (Mandatory and Exempted Activities) Regulation* (PoA 1993), there are no provincial EIA requirements for the proposed Green Line, including the Project, as confirmed by AEP in 2017. Within the *Activities Designation Regulation* (PoA 2017c) under Alberta's EPEA (PoA 2017b) the construction and operation of the Project does not trigger any approval, registration or notification.
- EPEA – Approval
 - The Project is not included as an activity identified in Schedule 1 (Divisions 1, 2, and 3) of the *EPEA Activities Designation Regulation*; therefore, no industrial approval is required.
- *Water Act / Public Lands Act* – Wetlands
 - A Level 1 Biophysical Impact Assessment (BIA), also known as a Preliminary Natural Site Assessment (PNSA), was conducted for the proposed Green Line, including the Project. The BIA addressed biological resources and physical features with the potential to be affected/impacted by construction including, but not limited to, wildlife, vegetation, water bodies and fish and fish habitat. The study area, that included the Project footprint, is shown on Figure 6. As related to the *Water Act*, the BIA concluded that there were no wetlands present within the local study area (i.e. 50 m buffer from the Green Line track; Tetra Tech Canada Inc. [Tetra Tech] 2018). A cursory review of aerial photography (conducted by Advisian) revealed there may be wetlands of low

permanence within the Project area. Therefore, prior to development at the Project site, a complete wetland assessment (i.e. desktop mapping, field assessment, wetland classification) will be completed. As required by AEP, for those wetlands determined to require a *Water Act* approval (based on assessed permanence), a detailed wetland assessment will be conducted including an Alberta Wetland Rapid Evaluation Tool-Actual (ABWRET-A). The ABWRET-A will be submitted to AEP to aid in the determination of the relative value of the wetland for compensation purposes. The *Water Act* application will include a Wetland Assessment and Impact Report (WAIR), an Avoidance and Minimization Plan and a Mitigation Plan.

- *Historical Resources Act* – Historical and Paleontological Resources
 - A Historical Resource Impact Assessment (HRIA; Bison Historical Services 2017) and a Paleontological Historical Resources Impact Assessment ([pHRIA]; Nautilus Paleontology Inc. 2016) were completed for the southeast segment of the Green Line, which covered the proposed Project location. The HRIA and pHRIA were conducted as required by Alberta Culture and Tourism. No archaeological or paleontological sites were identified in the assessments and clearance to proceed with construction was provided, with a condition that historical resources monitoring be conducted at two specific locations during construction. The locations noted for further monitoring are within the larger Green Line footprint (southeast segment) and are not associated with the Project footprint.
- *Railway (Alberta) Act*
 - Urban railway transit systems are not included within the *Railway (Alberta) Act* (PoA 2010) which approves public railway systems; as such there are no provincial regulatory requirements for the Project.
- *Municipal Government Act*
 - Under the *Municipal Government Act* ([MGA]; (PoA 2018), municipalities are charged with the responsibility to provide good government; to provide services, facilities or other things that, in the opinion of council, are necessary or desirable for all or a part of the municipality; and to develop and maintain safe and viable communities. The MGA forms the basis of many of the municipal requirements outlined in the next section.

1.4.3 Municipal and Regional Requirements

Pursuant to development within Calgary, the following municipal and regional plans, initiatives and bylaws apply:

- The City of Calgary Municipal Development Plan (The City of Calgary 2013);
- Calgary Region Airshed Zone (CRAZ) Particulate Matter and Ozone Management Plan (CRAZ 2014);
- Calgary Land Use Bylaw (Land Use Bylaw Sustainment Team, Development and Building Approvals, Planning Implementation 2008);
- South Saskatchewan Regional Plan (PoA 2014a);
- South Saskatchewan Region Air Quality Management Framework (PoA 2014b);
- South Saskatchewan Region Surface Water Quality Management Framework (PoA 2014c);

- The City of Calgary's Environmental Management System and Policies (The City of Calgary 2017b, 2017c); and
- Too Good to Waste (PoA 2017d).

The City of Calgary requires that the following permits be obtained prior to development:

- Development Permit;
- Land Consolidation Permit;
- Land Use Re-designation;
- Drainage Permit and Wastewater Discharge Permit;
- Street Use Permit (if street use is required for construction activities);
- Building Permit; and
- Trades Permits (as applicable).

The City of Calgary requires the construction and operation of the Project to comply with the following:

- Contractor Responsibility Package;
 - Project Environmental Construction Operations (ECO) Plan (environmental plans) reviewed and approved by The City of Calgary.
- Streets Bylaw;
- Community Standard Bylaw;
- Land Use Bylaw;
- Wastewater Bylaw;
- Drainage Bylaw:
 - Code of Practice for Drainage.
- Spill Reporting Procedure; and
- Waste and Recycling Bylaw.

1.5 Regional Environmental Studies

There are no regional studies as defined under the *Canadian Environmental Assessment Act, 2012* (GoC 2018b) that apply to the property in which the Project is to be located (Tiege 2018a, pers. comm.).

2. Project Information

2.1 Project Context and Objectives

The City of Calgary has purchased vacant land within a commercial and industrial area of Calgary for the purpose of constructing the Project. The Project will service a new major light rail transit system that will ultimately span the current length of The City of Calgary (north to south)¹.

The Project will provide the maintenance and storage services for LRVs associated with the Green Line. The Project will include 28 sidings with approximately 17.5 km of track. The Project will comprise tracks for heavy and light duty maintenance bays, wash bays, paint bays and equipment testing areas. The entire Project will occupy an area of approximately 226,700 m².

The components of the Project include a Maintenance Facility including maintenance bays, LRV Servicing (cleaning platform and wash bays), Body Repair and Paint Shop, Test Track, LRV Storage Barn, an Administration Building and Staff Facilities, and parking. See Figure 4 for the Project layout.

The City of Calgary is investigating low-floor LRVs for the Green Line. A low-floor LRV is a type of LRV that provides, or provides near to, level boarding from a platform that is only slightly above sidewalk level. This elevation is achieved by reducing the height of the vehicle's passenger floor to between 300 millimetre (mm) and 350 mm from the top of rail. In order to accommodate this reduction in floor height, low-floor vehicles are designed with walk-through or U-shaped train wheel sets, and roof-mounted equipment. As a high platform is no longer required to achieve level boarding, the reduction in floor height allows for somewhat reduced station infrastructure on the Green Line.

Low-floor vehicles are not compatible with The City of Calgary's existing high-floor rail lines and existing high-floor maintenance facilities. Therefore, a completely separate rail line, the Green Line, and maintenance and storage facility, the Project, is being specified and constructed to meet the operational and maintenance requirements of the low-floor LRVs.

2.2 Designated Physical Activities

Physical activities that are required to undergo a screening under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012; GoC 2018b) are defined in the *Regulations Designating Physical Activities* (the Regulations) (GoC 2018a). Pursuant to item 25(b) of the Regulations, the following defines a designated physical activity which is required to undergo a screening under *CEAA 2012*:

¹ The new transit line, the Green Line, is designed to provide efficient service and connections to destinations throughout The City of Calgary, and areas where people can live affordably with access to amenities, services and sustainable mobility options. The initial stage (Stage 1) of the Green Line construction is 20 km in length and will include 14 stations connecting 16 Avenue North (Crescent Heights) to 126 Ave Southeast (Shepard). Stage 1 of the Green Line is estimated to serve between 60,000 to 65,000 customers on opening day and generate public transit availability to 191,000 existing jobs. The first stage of construction is scheduled to be completed by 2026.

The “construction, operation, decommissioning and abandonment of a new railway yard with seven or more yard tracks or a total track length of 20 km or more”.

Consequently, since the Project consists of approximately 17.5 km of track with 28 sidings, the proposed Project is considered to be a designated physical activity.

The Project will provide the maintenance and storage services for the new fleet of low-floor LRVs associated with the Green Line. Since Stage 1 of the Green Line is estimated to be only 20 km it is not considered a designated physical activity, which CEAA has confirmed.

2.3 Components and Activities

2.3.1 Physical Works

The Project will consist of approximately 17.5 km of track with 28 sidings, associated buildings, equipment and utilities. There are no current structures present on the Project footprint and therefore construction of each of the components will be required as part of the Project. The main components of the Project include:

- Maintenance Facility including maintenance bays;
- LRV Servicing (cleaning platform and wash bays);
- Body Repair and Paint Shop;
- Test Track;
- LRV Storage Barn;
- Administration Building and Staff Facilities; and
- Parking (employee and visitor).

The Project will require connection to existing City of Calgary utility services. The connection points (noted on Figure 4) and on-site utilities will remain under the care and control of The City of Calgary during facility operation. The anticipated utility details include:

- Wastewater (Sanitary): connect to existing line using a 300-mm diameter polyvinyl chloride (PVC) pipe;
- Stormwater: connect to existing line using a 300-mm diameter PVC pipe;
- Water Supply: connect to existing line using a 250-mm diameter PVC pipe. The annual water demand has been estimated at 7,000 cubic metres (m³).
- Natural Gas, Electrical and Telecommunications: connection details not yet available at this design stage.

A full review of the design of the Project track work and structures will be undertaken once the LRV specification has been further defined; The City of Calgary has not yet selected a vendor for the LRVs at this time. LRV design specifications can vary quite significantly when considering various manufacturers. Although many LRV suppliers can supply the type of low-floor LRV under consideration, the option finally selected could still have an impact on the workshop provision required. The Project design will need to be tailored to the intrinsic characteristics of the selected low-floor LRV, but also consider other vehicles that will be

operating on-site within the Project, such as road/rail maintenance vehicles, delivery trucks, etc. In addition to vehicle width, height and length implications generally around the site, any later changes to vehicle length could have significant impact on the design, construction and operability of the Project buildings.

The vehicle dynamic envelope (VDE) of an LRV is the maximum space that the vehicle may occupy as it moves along the track. The VDE includes many factors due to the normal actions of the vehicle's suspension system, such as car-body roll (side sway) and lateral movement between stops. The VDE also includes lateral free-play between wheels and rail with both in their maximum wear condition as well as abnormal conditions that may result from failure of suspension elements (e.g. failure of the primary coil spring) (Transit Cooperative Research Program [TCRP] Report 155 "Track Design Handbook for Light Rail Transit").

The VDE is used during the design of the Green Line track to ensure that suitable clearances will exist between wayside infrastructure and a moving LRV. Within the proposed Project, LRVs will move at much lower speeds and around much tighter radius curves than occurs on the Green Line, therefore the physical shape and dynamic characteristics of the design LRV will also be taken into account during the design of the Project.

The VDE and clearance considerations include but are not limited to the following:

- track horizontal alignment and curvature;
- size of turnouts;
- swept path analysis on tight radius curves;
- storage track spacing;
- position of overhead catenary system (OCS) poles and other structures;
- high-level access platforms within the maintenance and servicing workshop;
- height allowances for lifting jacks and crange requirements;
- clearances to walls and other fixed infrastructure where pedestrians have access; and
- location and type of lifting jacks.

The number of sidings and track design is currently modeled to accommodate the storage and maintenance needs of the final capacity requirements of the Green Line.

The rail ties utilized for LRV are markedly different from non-LRV train systems. No creosote-soaked timber will be installed. The type of rail ties will be confirmed through detailed design. The connections will be solely to municipal light rail networks and not to regional, provincial or national rail networks.

Traffic flow within the Project area was a primary design criterion. A fully bi-directional flow around the Project gives the operator options on how servicing activities and revenue service launch are handled. This design option will save time and create efficiencies for both the service and Green Line operations.

Two separate leads each allowing access and egress from the Project are included to ensure that a derailment or other obstruction on one lead does not isolate the Project from the Green Line.

The track summary for the main components of the Project is as follows:

- Maintenance Facility/Maintenance Bays: 8 tracks (900 metres [m] total), 13 bays;

- LRV Servicing: 2 tracks (500 m total), 2 bays;
- Body Repair and Paint Shop: 2 tracks (500 m total), 6 bays;
- Test Track: 1 track (1,350 m), no bays; and
- LRV Storage Barn: 15 tracks (5,800 m total), no bays.

Additional detail regarding the purpose, approximate dimensions, and capacity of each of the above-noted components is provided below.

2.3.1.1 Maintenance Facility Including Maintenance Bays

Maintenance is responsible for servicing and maintaining the fleet of LRVs. Maintenance activities (further defined in Section 2.3.2) will include, but are not limited to:

- Light repair such as preventative maintenance, door function, controls function, and overhead equipment;
- Heavy repair such as train wheel set repair, wheels and tires, welding and fabrication and electronics repair;
- Dedicated roof maintenance bays that involves the removal of a subsystem off of the vehicle and to repair/rebuild it in a dedicated work area; and
- Wheel truing or lathe bay for the truing or profiling of LRV wheel sets without removing from the vehicle.

Due to the climate of The City of Calgary, the Maintenance Facility and associated bays will be in a climate-controlled building. Each bay will have capacity to house a single car. The Maintenance Facility footprint has been established at approximately 50,500 m² comprising the following:

- 27,200 m² for the LRV Storage Barn;
- 20,300 m² for the Maintenance Facility; and
- 3,000 m² for Administration Building and Staff Facilities.

2.3.1.2 LRV Servicing

The LRV Servicing area will include washing, cleaning and sanding bays and will have a footprint of 2,300 m² consisting of two tracks running through the building with a cleaning platform at one end and a wash bay at the other. The components of the LRV Servicing area will include:

- Automated drive through wash system that will include reclaimed water systems with a possible reverse osmosis final rinse system. The washer may also include a blower system for drying and a wash equipment room to accommodate all associated wash equipment, reclamation sumps and water storage tanks;
- Cleaning platform for routine interior servicing of LRVs, daily inspections and replacement of windshield washer fluid as required; and

- Traction sand filling station (incorporated into the cleaning platform) for replacement of traction sand as required. Traction sand is a requirement on LRVs and is free of salt and other contaminants that could solidify if wet. Traction sand is stored in a specialty silo that is sealed and dry. Each LRV is equipped with a sanding system to assist with traction and braking when the tracks are wet, snow covered, icy or obscured with debris.

2.3.1.3 Body Repair and Paint Shop

The Body Repair and Paint Shop aligns three functions of media blasting (i.e. bead/sandblasting to roughen a surface, shape a surface or remove surface contaminants), preparation and painting and will occupy 1,600 m² of the Project footprint of which 1,350 m² is the Body Repair Shop and 250 m² is the Paint Shop. Areas for all three functions will be contained separately to prevent dust and particulates from spreading around the shop, ensuring worker safety. The Body Repair Shop will dismantle damaged or weathered LRV train car body parts. Once the parts are off the vehicle, technicians will repair/restore the parts and prepare them for the paint process. The Body Repair Shop activities could include patching, sanding, bead/sandblasting, forming, dusting, welding or fabricating replacement body parts.

Rail car and component painting will take place within a dedicated Paint Shop. The Paint Shop will be used to apply paint to the repaired/restored parts. The parts will remain in the Paint Shop until the paint is fully cured. Once the paint is finished curing, the parts will be moved back to the Body Shop to be reinstalled on the LRV. The Paint Shop and associated systems will meet the requirements of National Fire Protection Association (NFPA) Standard 33, 2011 Edition and Alberta Building Code 2014.

Though the exact composition of the Paint Shop atmospheric emissions is unknown at this point in the design, during operation and consistent with industry standards, atmospheric emissions will be handled by make-up air filters and exhaust air arrestor filters that are designed to filter 99.8% of particulates. The Body Repair and Paint Shop will be designed, operated and maintained in a manner similar to other body shops in Calgary.

All paints and solvents will be stored in chemical lockers designed for the safe storage of paints and solvents. When in use, the solvent is stored in a dedicated paint mixing room attached to the Paint Shop. Liquid wastes (i.e. waste paints and solvents) will be stored in chemical lockers designed for safe storage of paints and solvents prior to disposal off-site or recycling off-site by a qualified third party.

All storage rooms or lockers will be vented separately. Exhaust from these areas will use the same make-up air filters and air arrestor filters used by the Paint Shop which are designed to filter 99.8% of particulates.

2.3.1.4 Test Track

A test track is required to test low-floor LRVs after corrective or heavy maintenance actions. Testing is done to ensure there are no issues before the LRV is used on the Green Line. The Project test track will also be used to receive and test new low-floor LRVs to ensure the fleet is ready and competent for service start.

The test track configuration will be approximately 1,350 m in length considering a minimum curve radius of 35 m. The use of 25 m radius curves was dismissed due to increased maintenance and risk of derailment as well as possible restrictions on the type of maintenance equipment which can be accommodated.

2.3.1.5 LRV Storage Barn

The LRV Storage Barn is an indoor, climate-controlled component of the Project that is used to protect and stage LRVs while they are awaiting maintenance or while they are waiting to start revenue service on the Green Line. The LRVs are stored in a compact and efficient configuration. No heavy maintenance activities are anticipated to be performed in the LRV Storage Barn. If heavy maintenance is required, the LRV is moved to the Maintenance Facility. Minor repairs may be conducted in this area to avoid needless movement of the LRVs.

The LRV Storage Barn will have a final footprint of 19,600 m² to meet the minimum capacity requirement. The footprint was calculated by estimating that the pairs of tracks would be set at 3 m apart centre-to-centre with a 1 m walkway on each side of a set of two tracks to keep the building as narrow as possible. This track and walkway layout may change as the design is progressed. There are seven sidings scheduled for the first stage of the LRV Storage Barn with an additional eight sidings scheduled for future development. The eight future sidings are included in the overall total of 28 sidings proposed for the Project. The staged development is a function of available funding. The current funding has been assigned to construct Stage 1 of the Green Line, which requires seven sidings at the Project site for maintenance purposes. As ridership increases and additional funding becomes available to expand the Green Line, the fleet will increase to support the new stage(s) and additional tracks will be required at the Project site to service the larger fleet. At present, there is no future funding planned for the Green Line.

2.3.1.6 Administrative Building and Staff Facilities

The Administrative Building will house offices, training rooms, change rooms, meeting rooms, and other support spaces. It is currently estimated to be a two-story building attached to the Maintenance Bays, covering a footprint of 11,000 m².

2.3.1.7 Parking

The parking lots will accommodate parking for staff, visitors, and deliveries and will be controlled by a security gate. The parking lot size will be confirmed through detailed design, however, the parking lots indicated on Figure 4 are considered to be the maximum size required to accommodate the Project.

2.3.1.8 Stormwater Management System

The Project will use several dry storm ponds that work in parallel to capture and convey stormwater off-site. Under normal service, these storm ponds are dry, with no permanent stormwater depth. Final, detailed design of the ponds has not yet been completed but the ponds will be lined with an industry standard product to eliminate infiltration.

Dry ponds are considered surge segments to the pipe system (minor system) where, if The City of Calgary storm sewers reach flow capacities, they overflow into the pipe system and dry ponds. Therefore, the dry ponds are, more often than not, dry and empty and are only filled during large storm events to offer stress relief to the minor system. Dry ponds have grated top catch basin drains at the bottom of each pond that act as 'inlet structures' and are directly connected to the minor system which is connected to The City of Calgary's main storm pipe system. Further, an outlet control structure (i.e. a weir) controls discharge and manages off-site flow between the stormwater ponds and the storm sewer system. The stormwater discharge quality will

meet The City of Calgary discharge standards by including an oil and grit Separator at the downstream end of the pipe system. The oil and grit Separator will be sized to meet The City of Calgary stormwater quality target, which is 85% total suspended solids removal. The preliminary stormwater system design meets both design requirements stipulated by The City of Calgary: flow rate and water quality.

The Project will use underground storage tanks (each with a 1,000 m³ capacity) for roof drainage collection. These tanks attenuate roof runoff that can be reused for gray water application if desired, which includes site irrigation or wash bay water reuse. Prior to re-use, this collected stormwater will be treated using filtration, an oil and grit separator and ultraviolet treatment. Stormwater quality will be monitored as part of the re-use system. These tanks offer additional active storage volume during large storm events that are then discharged to the main storm pipes that are connected to the storm ponds. To avoid potential groundwater impacts from these tanks, an impermeable liner will be installed around the storage tanks.

2.3.2 Production Capacity

The exact service and maintenance schedule will be modeled once the LRV manufacturer is selected. At this time The City of Calgary has not yet chosen a specific LRV to employ. The outcome of the selected maintenance schedule will be to reduce the potential for spills or incidents that may cause environmental impacts.

The City of Calgary will apply the maintenance strategy from the current transit system to the new LRV system. This maintenance strategy includes the following definitions for the levels of maintenance utilized:

- Level 1, Light and Routine Maintenance: Maintenance practices and activities that occur on the LRV itself including vehicle cleaning and servicing, mechanical adjustments, replacement of line replaceable units (LRUs) or replacement of a vehicle subsystem as a unit. The intent of this level of maintenance is to return the LRV to service in the shortest time possible.
- Level 2, Corrective Maintenance: Maintenance practices and activities that involve repair of a subsystem off of the vehicle, often on a workbench or in an area with equipment specific to the repair being carried out. An example is corrective maintenance of an LRU through the fault-finding and eventual replacement of a lowest line replaceable unit or subcomponent such as a circuit board. The intent of this level of maintenance is to return LRUs to serviceable condition and replace them into stock such that they can be used during Level 1 maintenance activities.
- Level 3, Heavy Maintenance: Maintenance practices and activities that involve the overhaul of a vehicle or vehicle subsystem. These activities are major interventions that are typically triggered by a predefined maintenance interval that is specific to the equipment being overhauled. Level 3 maintenance activities can be done onsite within the Project, off-site in another location, or where specific knowledge and equipment doesn't exist in Calgary Transit, the equipment can be transferred to a third party for overhaul. An example of a Level 3 maintenance activity would be the overhaul and rebuild of LRV train wheel sets involving a multi-day major intervention maintenance activity to remove, tear down, inspect, rebuild, test, and return to service.

The maintenance strategy will help define the type and frequency of activities to be carried out and will be supplemented by industry guidance such as the American Public Transportation Association's (APTA) Fixed Structures Inspection and Maintenance suite of recommended practices. A typical frequency for

distance-based planned preventative maintenance (PPM) for low-floor LRV fleets are in the order of magnitudes shown below:

- 5,000 km - light maintenance;
- 30,000 km - routine maintenance; and
- 180,000 and 240,000 km – heavy maintenance.

These distances are to be updated/confirmed when more detailed information comes to hand on the supplier of the new fleet of LRVs during the procurement phase. Based on the length of the Stage 1 Green Line and the distance each train will cover daily it is expected that for Stage 1 operation the LRVs will undergo:

- light maintenance monthly (for all cars);
- routine maintenance every seven months; and
- heavy maintenance every 3.4 to 4.5 years.

The current assumption is that the following cleaning schedule will be applied:

- For daily LRV cleaning:
 - exterior wash using washing plant;
 - floor sweep and mop;
 - wipe handrails;
 - clean windows and interior glass;
 - wipe driver's cab desk surfaces; and
 - examine seats and interior hard surfaces for dirty marks and graffiti.
- For monthly LRV cleaning:
 - As for daily clean and additionally:
 - wash all visible interior hard surfaces except ceilings;
 - clean exterior louvres, pockets, etc.;
 - clean driver's seat (or replace seat cover with clean); and
 - change any passenger seat covers that are soiled or damaged.
- For six monthly LRV cleaning:
 - As for monthly and additionally:
 - wet vacuum (or equivalent) all passenger cab upholstery and seat covers; and
 - clean ceilings and lighting diffusers.

The water supply for the Project will be municipal and based on the usage from other light rail facilities in Calgary it is anticipated that the Project will consume about 7,000 m³ of water annually. The grey water will be reused for LRV wash and it is anticipated that 70% of water used will be recycled water.

2.3.3 Incidental Activities

All of the Project components as noted under Sections 2.3.1.1 to 2.3.1.8 are essentially incidental activities. The Project aspect for which a Project Description is required under the Regulations is defined in Section 2.2 of this document. Ancillary to the sidings and track length is the maintenance, storage and administrative buildings previously identified, all of which are complimentary to the designated aspect of the Project.

Construction of the Project will be carried out by a contractor who will have care of construction execution and commissioning. The City of Calgary will maintain control over the construction and commissioning and have direct influence over the contractor. Once construction is completed The City of Calgary will take over care and control of facility operation – for use by The City of Calgary, only.

The designated Project and the affiliated Green Line is for the benefit of the public and will be operated in accordance with the appropriate federal and provincial safety regulations. Further discussion of applicable regulatory requirements is found in Section 1.4 of this document.

2.4 Emissions, Discharges and Waste

2.4.1 Atmospheric Emissions

During the life of the Project, emissions of criteria air contaminants (CACs), greenhouse gases (GHGs) and dust/particulate are expected. The CACs typically include hydrocarbons (HC), nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO) and suspended particulates in various sizes such as total suspended particulates (TSP), particulates with a diameter less than 10 microns (PM₁₀) and PM_{2.5}. GHG emissions are typically reported as carbon dioxide equivalent (CO₂e).

There are several ambient air quality monitoring stations in The City of Calgary. The closest active stations are Calgary Central Inglewood, Calgary Northwest, and Calgary Southeast. Monitored ambient air quality results from these stations are used to represent baseline air quality of the Project area and are summarized in Section 5.1.6. Throughout construction and operations phases, ambient air quality will be measured continuously at these existing monitoring stations. Should any changes be noted that are related to the Project, facility construction and operation procedures will be reviewed, and additional mitigations will be installed/initiated as appropriate.

The anticipated GHG emissions from facility operation include natural gas boilers (42,000 gigajoules per year [GJ/year] and 2,205 tonnes/year of CO₂e) and vehicular traffic (188 staff/day and 270 tonnes/year of CO₂e). There are no dust/particulate emissions anticipated during facility operation as the Project parking lots/roadways will be paved and the rail traffic will operate on tracks. The estimated annual operational emissions have been modeled after an existing facility in Calgary (Oliver Bowen Facility). The boiler emissions were calculated using publicly available emission factors such as Canada's National Inventory Report 1990-2016 (UNFCCC 2018) and conversions published by Natural Resources Canada. For vehicular traffic, the estimation was based on one round trip per staff/day from the gate to the parking lots (300 m) and 365 days/year of operations. Vehicle type is assumed to be light-duty diesel trucks.

During the construction phase of the Project, air emissions will include dust/particulate emissions and GHG emissions associated with the construction equipment. Vehicle emissions will be limited by reducing idling time for the construction equipment and dust/particulate emissions will be limited by employing standard

dust control measures as outlined in the ECO Plan (to be prepared by the selected contractor). The City of Calgary will require the selected contractor to develop an ECO Plan for the Project which will include details such as the scope of work overview, compliance requirements, site characteristics, potential environmental impacts and mitigations, sediment and erosion control, hazardous material management, waste management, monitoring and reporting, emergency prevention and response, and ECO Plan implementation. The development and implementation of an ECO Plan is a requirement of The City of Calgary. The ECO Plan will be executed and upheld by the contractor throughout construction. Contractor performance will be audited by The City of Calgary and/or its designated representative. Construction will employ equipment that meets the United States Environmental Protection Agency (US EPA) Tier 4 Standards for non-road engine and vehicles (US EPA 2016).

Construction-related GHG emissions are estimated using activity-based fuel consumption rates for the following construction activities: land clearing, grading track work, and building the Project. Diesel equipment such as scrapers, excavators, dump trucks, concrete mixer truck, front end loader, bulldozer, concrete pumper truck, hydraulic truck crane, track ballast regulator, track tamper, skid steer and pickup trucks are expected during the construction phase. The construction equipment is estimated to include scrapers, excavators, dump trucks, loaders, bulldozers and pickup trucks, for example. Using emission factors from Canada's National Inventory Report 1990-2016 (UNFCCC 2018), the total amount of GHG emissions during the construction phase is estimated to be approximately 15,448 tonnes per year (t/a) of CO₂e, which accounts for 0.0059% of the 2016 Alberta GHG emissions (UNFCCC 2018).

In addition to dust and GHG emissions during construction, fuel combustion from construction equipment will result in emissions of CACs such as NO_x, CO and PM_{2.5}. Construction CAC emissions could result in small detectable quantities of these contaminants relative to background levels. Any occurrences of elevated CAC emissions resulting from Project-related construction activities will be immaterial and short-lived due to the temporal and spatial characteristics of the Project-related construction activities.

The anticipated construction equipment indicates that the operational periods of each piece of the equipment are temporal (i.e., non-continuous). The hours provided are periods of the equipment available for use but not necessarily in operation at the maximum power output. Most of the construction equipment is used only within the construction area except for vehicles. The equipment will not be used simultaneously as some are only used 52 day/year while some are used almost daily (312 day/year). The location of the equipment is also changing within the construction area as the construction proceeds.

The construction equipment is estimated to emit a total of approximately 15.5 kilotonnes per year (kt/a) of CO₂e. Based on Community-Wide GHG inventory in Calgary (The City of Calgary 2019), The City of Calgary emitted approximately 17,679 kt of CO₂e in 2018. The Project construction GHG emissions are estimated to be approximately 0.087% of The City of Calgary's annual emissions. Although the emission rates for CACs would differ from that of GHGs, this information can represent the immateriality of the emissions from construction equipment within The City of Calgary.

2.4.2 Liquid Discharges

Liquid waste will primarily consist of rail car wash water and stormwater runoff.

LRV wash water will be managed through a recycling system that is expected to consist of a collection and settling vessel and will function to recycle approximately 70% of the fresh water used. The LRV wash water is anticipated to contain road treatment products such as sand, salt and washing detergent. The LRV wash water

that cannot be re-used will be discharged into The City of Calgary's existing sanitary sewer system for treatment at The City of Calgary's effluent treatment plant. The City of Calgary maintains discharge quality requirements for accepting wastewater into the sewer system. All discharge must comply with The City of Calgary Bylaw Number 45M2016 regulating wastewater disposal and protecting the wastewater system or its processes from damage, obstruction, toxic upsets or loss of efficiency (The City of Calgary 2012) as it outlines the restricted and prohibited discharge substances. Wash water will be collected in underground sumps and tested prior to discharge to The City of Calgary's sanitary system. Should the wash water not meet The City of Calgary discharge quality requirements, then the water will be removed from the Project site for disposal by a licensed contractor.

The stormwater runoff will be managed through the use of several dry stormwater ponds that work in parallel to capture and convey stormwater off-site (Figure 4). The dry ponds have grated top catch basin drains at the bottom that are directly connected to the minor pipe system which is connected to the main storm pipes, allowing water to be shared between the two systems, and act as 'inlet structures' for the stormwater ponds. The ponds will be lined with an industry standard product such that no infiltration will occur at the ponds, managing potential groundwater contamination. For the most part, these dry ponds will only fill during large storm events when storm sewers are at capacity. Outlet control structures, upstream of discharge locations provide control in managing off-site flow between the stormwater ponds and the storm sewer system. This flow is restricted to a maximum flow rate release. Once that point has been reached, the dry ponds will fill as needed. The stormwater is anticipated to be relatively clean though it may contain oil and grease, lubricants, sand/soil and salt. An oil and grit separator will be installed at the discharge end of the pipe system. Although the dry ponds will offer surge relief to the pipe system during large storm events, most contaminants are contributors during small storm events, so contact between contaminants and dry ponds is expected to be very limited.

The City of Calgary maintains runoff discharge requirements in accordance with Bylaw Number 47M2016 for accepting runoff from industrial operations (The City of Calgary 2005) and the Code of Practice for Drainage Activities (The City of Calgary 2016a). It is expected that stormwater quality will meet municipal stormwater discharge limits, as the water is primarily un-impacted rainfall runoff. An oil and grit Separator will be installed at the discharge end of the pipe system. The design, construction and operation of the Project have been tailored to ensure that stormwater quality will meet The City of Calgary's Bylaw requirements.

During construction, surface water runoff will be managed in accordance with The City of Calgary-approved ECO Plan that will be prepared by the contractor. There are no other liquid discharges anticipated during construction. The ECO Plan will include best management practices for the management of accidental releases (i.e. unforeseen leak/spill of oil and lubricants, gasoline from construction equipment). Any accidental release will be reported to The City of Calgary and will be appropriately remediated.

Areas where chemicals will be stored will have sumps and emergency response plans to contain potential spills. All maintenance activities will be conducted within buildings on concrete pads which will contain any spills and restrict the potential for impacts to the surrounding environment, including stormwater runoff.

Another anticipated liquid waste stream includes oil and other lubricants required for LRV maintenance and operation. Used oils and lubricants will be disposed of in accordance with the *Lubricating Oil Material Recycling and Management Regulation* (PoA 2016a). There will be no discharge of oily waste to land or water. All oil products and other lubricants will be stored in tanks that meet the Canadian Council of Ministers of the Environment (CCME) code of practice for tanks containing petroleum and allied petroleum products, PN 1326 (CCME 2003).

In addition, secondary containment for the tanks must meet the Calgary Transit Secondary Containment Guidelines (Calgary Transit 2004). Secondary containment for the tanks will be designed to contain a spill from the largest vessel plus 10% of all the other containers in the design area. Containment will be constructed of non-combustible material and have a liquid tight seal. Secondary containment for indoor storage of small quantities may be comprised of readily available absorbent material and/or portable dikes. Under no circumstances is outdoor storage allowed without secondary containment and weather protection.

Paint will be disposed of in accordance with the EPEA (PoA 2017b). There will be no discharge of paint waste to land or water.

Domestic sewage will be discharged to The City of Calgary sewage system through a 300-mm diameter PVC pipe connected to an existing line. The discharge line will remain under that care and control of The City of Calgary.

Anticipated liquid waste streams include LRV wash water that will be recycled within the system and then sampled prior to discharge to The City of Calgary's sanitary system, and stormwater runoff that will be contained within the Project's stormwater ponds prior to discharge to The City of Calgary storm sewer system in accordance with the storm sewer bylaw.

2.4.3 Waste

General waste is expected to comprise electronics, domestic waste from the administration building, and maintenance waste from the maintenance buildings (expected to be oily cloths, oil filters, metal parts, electronic components, and batteries). Waste management areas will be contained within buildings. The Project will generate both recyclable and non-recyclable solid and liquid wastes. Recyclable material will be separated into labelled containers and removed from the Project site for recycling by a qualified carrier. Some used mechanical parts will be eligible for returning to the manufacturer when replaced in accordance with the regular maintenance schedule. Non-recyclable waste will be collected on-site and then sent off-site for disposal through a qualified carrier. The volume of waste generated will be managed through The City of Calgary waste and recycling pick-up program. Any waste that is not able to be picked up will be disposed of through a contracted qualified carrier.

During construction, any non-contaminated surplus soil will be stockpiled within the Green Line footprint for future use or used immediately elsewhere within the Green Line footprint. Soil stockpiles will not be located within the Project footprint. The stockpile(s) will be seeded to reduce erosion potential.

All waste, including electronics, domestic waste, maintenance waste, non-contaminated surplus soil, oils and lubricants, waste paint and domestic sewage, will be disposed of off-site at an approved waste management facility appropriate to the waste type and will be transported by qualified carriers.

2.5 Project Phases and Schedule

2.5.1 Key Project Phases

Key project phases include:

- Engagement: 2015-2019;

- Design: 2016-2020;
- Construction: 2019-2024;
- Commissioning: 2024-2026;
- Operation: 2026-2126; and
- Decommissioning: approximately 2126.

Each key project phase is described in the following sections.

2.5.2 Main Activities

2.5.2.1 Engagement

Indigenous Peoples engagement began Q1 2016 and continued through to Q1 2017. The City of Calgary initiated further engagement in July 2018 upon receiving a list from CEAA including recommended Indigenous Groups/Communities for engagement centered around the Project. The City of Calgary delivered a Notification Letter to 21 Indigenous Groups/Communities by registered mail on July 30, 2018. The Notification Letter included a brief description of the proposed Project and figures to indicate the proposed location and facility details. Further details on Indigenous Peoples engagement are noted in Section 6.

Public engagement was carried out through 2016 and into 2017 incorporating information sessions and distribution of printed material. Public engagement is further described in Section 7.

2.5.2.2 Design

The design team (The City of Calgary and Owner's Engineer) have engaged Calgary Transit to identify the performance requirements for the Project. Once the requirements are established, the Project design team will develop a Reference Concept Design package and Technical Performance Requirements. The Reference Concept Design package will consist of drawings and the Technical Performance Requirements will consist of varying performance-based and prescriptive specifications which must be met in the design, construction testing and commissioning of the Project. Final, detailed design will be conducted by the design/build contractor (to be identified through The City of Calgary's procurement process). It should be noted that the detailed design is not expected to differ substantially from the current Project design. The Project components, inputs and outputs will remain the same.

2.5.2.3 Construction

Topsoil and subsoil will be stripped, salvaged and stockpiled prior to site grading, placement of fill, and/or site development. Soil will be reused off-site or stockpiled off-site in designated topsoil and subsoil stockpiles.

The site will be fenced off. Roadways and railways into the site will be constructed to connect to existing transportation infrastructure. Site construction infrastructure (e.g. trailers, electricity, natural gas services) will be installed. Construction laydown, storage and fabrication areas will be established.

Grading activities within the Project footprint will include collecting/placing fill with earth-moving equipment to build the subgrade, followed by compacting the subgrade. Once the subgrade has been constructed, the

ties and steel rails will be laid by a qualified contractor. Ballast will then be dumped in place. Specialized rail construction equipment will tamp the ties and steel rails so that the ballast settles into place.

Final grading will include contouring drainage ditches to channel water toward the runoff ponds.

The foundations for the maintenance, storage and administrative buildings will be excavated, and concrete poured. Structural steel will then be erected on the foundations. Some modularization and preassembly work will occur where practical to speed building erection. Roof cladding and wall cladding will then be installed to enclose the building while equipment installation continues indoors. Once the building is enclosed, the building may be heated to facilitate work in cold weather.

Temporary structures will be required during construction, including equipment storage, workforce muster points, and for various other functions. The temporary structures will be similar to those typically used on construction sites. All temporary structures will be removed from the site once construction is complete.

2.5.2.4 Commissioning

Prior to Project operation, testing and commissioning of various pieces of equipment and systems will occur. It is expected that the testing and commissioning phase of the Project will span two years subsequent to construction. The Project will then be ready for commercial operation.

2.5.2.5 Operation

The Project is expected to be in operation for a century with daily maintenance, wash and storage of LRVs occurring for 24 hours per day. Additional details regarding the anticipated maintenance, servicing and cleaning schedules are provided in Section 2.3.2. No long-term storage of LRVs at the Project site is anticipated.

2.5.2.6 Decommissioning

Decommissioning will involve the removal of all surface and subsurface installations. The site will be regraded to facilitate positive drainage and clean subsoil and surface soil (ideally from salvage) will be placed at a depth in accordance with the current regulation at the time. Reclamation and remediation of the site will also be consistent with the regulations at the time. Currently there are three management options for contaminated sites under the Alberta reclamation framework: Tier 1, Tier 2, and Exposure Control Guideline (AEP 2016a, 2016b, 2016c). The guideline that is most applicable will be selected for remediation standards and benchmarks. The site will be seeded with a mixture consistent with the surrounding Foothills Fescue Subregion of the Grassland Natural Region as described in Section 5.1.1 of this document. The initial decommissioning activities are expected to be completed within two years. Subsequent to this initial decommissioning, ongoing monitoring will take place to ensure the reclaimed area is developing as expected. Monitoring will be carried out for several growing seasons until there is assurance that the site will ultimately return to a natural state.

Conversely, it is possible that by the end of 100 years of operation of the Project there will be an alternative land use strategy for the site and a future development project will be planned. If the future of the site is development, then The City of Calgary will undertake any remediation required to ensure the site does not contain contaminated soils prior to re-development.

3. Project Location

3.1 Location Description

3.1.1 Project Coordinates

The Project is proposed to take place on two parcels of land owned by The City of Calgary, located in Calgary, that cumulatively amount to approximately 30 hectares (ha) with a centre located at approximately N 50° 56' 15", W 113° 58' 51".

3.1.2 Site Location Plan and Map

Figure 1 shows an overview of the Project location in Calgary and Figure 4 depicts the Project area and components.

3.1.3 Location of Project Components and Activities Map

Figures 2, 3, 5 and 7 identify the Project location in relation to natural features, parks and environmentally sensitive areas, infrastructure and neighbourhoods, nearby residences, nearby Historic Resource Value (HRV) lands and Indigenous Peoples settlement land for engaged groups.

3.1.4 Photographs of Work Locations

Photographs of the Project location are provided in Appendix 1.

3.1.5 Proximity to Other Land Uses and Other Aspects

Directly south of the proposed location is a commercial district of approximately (~) 183 acres (~780 m north to south by ~985 m east to west); beyond that lies the nearest neighbourhood (~780 m south).

Directly north of the proposed site is a property owned by Crop Production Services of approximately 225 acres (~1,185 m north to south and ~765 m east to west). This area is zoned for future urban development.

The east side of the proposed location is bounded by 52nd Street SE beyond which lies more industrial development and Shepard landfill (operated by The City of Calgary) located on land zoned for special purposes (primarily for infrastructure and utility facilities, including public transportation operated by the federal, provincial and municipal levels of government).

The west is bordered by a community area occupied by businesses.

The City of Calgary sits within Treaty 7 area which comprises the following Indigenous Groups/Communities: Blood Tribe, Piikani Nation, Siksika Nation, Stoney Nakoda First Nations and Tsuut'ina Nation. The City of Calgary recognizes that these Indigenous Groups/Communities, as well as Métis communities and Indigenous Groups/Communities from Treaty 6 and from British Columbia may have traditional territories that overlap with the Project footprint.

The Project will not be located on federal land. The closest federal lands are Tsuut'ina Nation, located approximately 12 km west of the Project. The land for the proposed Project does not contain any settlement land.

The location of the Project in relation to provincial and international boundaries is shown in Figure 3. The distance to the boundaries are as follows:

- Alberta-Saskatchewan border: 277 km;
- Alberta-British Columbia border: 84 km;
- Alberta-Northwest Territories border: 1,008 km; and
- Canada-USA border: 215 km.

3.2 Land and Water Use

The Project will be located on land owned by The City of Calgary and zoned appropriately for the proposed development (as described in Section 3.2.1). There will be no impact on land use zoning in areas surrounding the Project. There is no surface water on or around the Project site. The closest surface water body is the Bow River which is located approximately 1.5 km west of the nearest corner of the Project.

3.2.1 Zoning Designation

In accordance with The City of Calgary Land Use Bylaw Number IP2007 (Land Use Bylaw Sustainment Team, Development and Building Approvals, Planning Implementation 2008) the proposed Project site is located on property zoned DC and S-CRI, defined as follows:

- S-CRI: Special Purpose - City and Regional Infrastructure (S-CRI) District: The S-CRI designation is primarily for infrastructure and utility facilities, including public transportation operated by the federal, provincial and municipal levels of government; and
- DC: Direct Control (DC) District: A DC is a customized land use designation. It has a list of allowable uses and a set of rules specific to a particular property or development. Most DC designations include a cross-reference to the rules of one of the standard designations of the Land Use Bylaw.

3.2.2 Legal Land Description

The location is currently vacant land in Calgary, Alberta within the legal subdivisions 1 and 2 of Section 10 Township 23 Range 29 West of the 4th Meridian (1&2-10-23-29-W4M). The land is owned by The City of Calgary. The City of Calgary is working on an application to have the parcels consolidated.

There is no surface water within the Project area. The closest surface water body is the Bow River which is located approximately 1.5 km west of the nearest corner of the Project.

3.2.3 Traditional Land Use

As shown in Figures 2 and 4, the proposed development site is vacant land within The City of Calgary, is surrounded by industrial and commercial developments, and has been securely fenced off from public access at least since the property was purchased by The City of Calgary. As such, there is likely no current land or resource use by Indigenous Peoples on the Project site. However, The City of Calgary recognizes that the traditional territories of a number of Indigenous Peoples may overlap with the Project footprint. The Indigenous Peoples engagement process currently underway will provide opportunity for concerns regarding traditional land use to be brought forward.

Environmental reviews/investigations were completed in 2016 and 2017 that covered the entire Project footprint (Advisian 2016a, 2016b, 2016c, 2017). The environmental investigation area is shown in Figure 6.

An environmental review was conducted for the east half of the proposed Project location (Advisian 2016a) which included a review of property ownership and examination of aerial photos. The property was previously owned by Telsec Property Corporation (from 2012-2016) and Western Cooperative Fertilizers (from 1967-2000). An aerial photo review demonstrated that the site was used for agricultural purposes from at least the 1940s to the late 1990s which included cultivated land. In the mid-1960s two communication towers were erected, and a third tower along with an access road (on the north boundary) was present by the 1990s. The eastern boundary of the property has been 52nd Street since the 1940s and the southern portion was bound by undeveloped land until the 2000s when a series of commercial buildings were constructed. Land north of the property was developed in association with the Shepard air field until the 1970s. Fertilizer operations were developed in the 1970s to the northeast of the property (Advisian 2016a),

The area surrounding the western half of the property underwent the same review process (Advisian 2016b). The aerial photo review indicated that the site was used for the storage of salvaged soil since the mid-1970s and prior to that was agricultural land dating back to the 1940s. An environmental investigation concluded that electrical conductivity (EC) exceedances in the Project footprint were most likely due to naturally high sulphate concentrations found in Alberta and therefore were the result of natural conditions and not attributable to historical industrial operations (Advisian 2017), supporting the aerial photo evidence that the area has not been used for industrial purposes. From the 1940s, the lands to the west and south were agricultural and undeveloped while the land to the north was part of the Shepard airfield. The first surrounding development occurred in the 1970s with the fertilizer operation taking over a portion of the Shepard air field for use as stormwater ponds (to the north). By the early 1980s, Deerfoot Trail was constructed to the far west of the property, with directly adjacent land on the west continuing to be used for agricultural purposes until the late 1990s when the construction of 40th Street SE began in the area and was completed by the early 2000s. By the mid and late 2000s industrial and commercial development was completed along 40th Street (the property immediately west). At the same time (early 2000s), closure of the fertilizer pond operation began and appears to have concluded with revegetation in the early to mid-2010s (land to the north). Directly south of the property began to be partially developed (the eastern side) in the mid-2000s. On the western side of the same land, and prior to that development, the land had been and continued to be used for agriculture from around 1950 to the early 2010s. The once agricultural portion that remained after development is now an undeveloped, disturbed site.

4. Federal Involvement - Financial Support, Lands and Legislative Requirements

4.1 Federal Financial Support

All three levels of government have committed funding for Stage 1 of the Green Line, which includes the Project.

Federal Government: On July 24, 2015 the Government of Canada made a funding announcement committing \$1.53 billion to the Green Line. This funding was contingent on matching funds from the Provincial and Municipal Governments. This funding announcement was the largest ever contribution by the Government of Canada to an infrastructure project in Alberta.

Provincial Government: On July 6, 2017, the Government of Alberta pledged up to \$1.53 billion over eight years to support Stage 1 construction of the Green Line; with funds anticipated to be derived through the Climate Leadership Plan.

Municipal Government: In December 2015, The City of Calgary committed \$1.56 billion over 30 years, contingent on matching contributions from the Federal and Provincial governments. On June 26, 2017, the Calgary City Council approved the concept alignment plan, of which Stage 1 of approximately 20 km was approved to move forward. The Green Line will be built in stages as funding becomes available. Stage 1 includes the proposed Project to provide the maintenance and storage facilities necessary for the Green Line.

Funding for Green Line Enabling Works projects: On December 3, 2016, the Federal and Provincial Government committed more than \$250 million dollars to fund a series of Enabling Works for the Green Line for 2017-2020. The funding is from the federal Public Transit Infrastructure Fund (PTIF) and the provincial Green Transit Incentives Program (GreenTRIP) and will provide transit infrastructure funding to more than 25 municipalities across Alberta. In Calgary, the funds will help prepare the Green Line right-of-way (ROW) for construction with items such as utilities, environmental remediation and land acquisition. Doing these types of projects proactively will manage project timelines and schedule risks and will allow future Green Line construction to occur more efficiently.

Stage 1 of construction will extend from 16 Avenue N to 126 Avenue SE (approximately 20 km including the Project) with an expected construction schedule of 2020-2026 and estimated to cost \$4.65 billion.

4.2 Federal Lands

No federal lands will be used for either the Green Line or the Project.

4.3 Federal Permits, Licences or Authorization

No known federal permits, licences or authorizations will be required for the Project.

5. Environmental Effects

Sections 5.1.1 through 5.1.7 describe the available information on the current physical and biological environment at the Project site and surrounding area.

Sections 5.2 through to 5.4 describe potential environmental impacts resulting from the proposed development and include proposed mitigations.

5.1 Site Conditions

5.1.1 Local and Regional Vegetation

The site is within the Foothills Fescue Subregion of the Grassland Natural Region (AEP 2015). The Grassland Region is characterized by rolling prairie and is home to about 25% (125 species) of Alberta's rare vascular plants, about half of which grow in grasslands (the other half in wetlands) (AEP 2015). Prior to development, the site would have likely been populated by mountain rough fescue, bluebunch fescue, juniper June grass, Parry oat grass, pasture sage wort, golden bean and Idaho fescue which is characteristic of the subregion's drier areas (AEP 2015). Wildflowers could have included sticky purple geranium, silvery perennial lupine, three flowered avens, woolly gromwell and western wild parsley (AEP 2015; Downing and Pettapiece 2006). Other common species may have included shrubs such as buckbrush, silverberry, prickly rose and Saskatoon as well as cinquefoil for moderate to well-drained sites, such as this area (Downing and Pettapiece 2006).

The natural vegetation of the proposed Project site was previously disturbed through a combination of industrial and agricultural land use. An aerial photo review demonstrated that the site was used for agricultural purposes from at least the 1940s to the late 1990s which included cultivated land and a lack of woody vegetation (Advisian 2016a, 2016b). The site has remained undisturbed for a sufficient amount of time to have re-established vegetation that is now dominated by agronomic grasses and invasive species. A vegetation field assessment of the site has not been carried out.

A Level 1 BIA concluded that there were no wetlands present within the local study area (i.e. 50 m buffer of the Green Line track) (Tetra Tech 2018). Advisian conducted a cursory review of aerial photography which revealed there may be wetlands of low permanence within the Project area. Prior to Project development, if required by AEP, a complete wetland assessment will be conducted in accordance the provincial *Water Act* requirements to assess the noted wetland features.

5.1.2 Wildlife and Habitat

The surrounding land uses (i.e. residential and commercial development, waste management facilities, and major transportation corridors), past agricultural and industrial disturbance, and present domination by agronomic and invasive vegetation, has likely homogenized the environment, reducing diversity and structure such that a variety of thermal, security, foraging, and nesting habitats are limited. Moreover, surrounding developments likely extend their influence into the site. In this way, sensory disturbances such as noise and light further reduce the attractiveness of the site for wildlife. Consequently, species richness and diversity are likely low. The Alberta Biodiversity Monitoring Institute's (ABMI) modeling of this area suggests extremely low

uniqueness² for (0 to 10%), low species richness³ (20 to 30%) and moderate intactness⁴ (40 to 50%) for all species (ABMI 2018). Although, these have been modeled higher for birds (intactness: 60-70%, richness: 50-60%, uniqueness: 10-20%) and mammals (intactness: 20-80%, richness: 40-50, and uniqueness: 10-20%; ABMI 2018).

Wildlife inhabiting or using the site are likely those that are common and tolerant to the conditions and disturbances typical of urban and disturbed environments. Such species may include small mammals such as mice and voles, coyote (*Canis latrans*), and white-tailed jackrabbit (*Lepus townsendii*). Similarly, migratory birds such as savannah sparrow (*Passerculus sandwichensis*), clay-coloured sparrow (*Spizella pallida*), Brewer's blackbird (*Euphagus cyanocephalus*), species at risk such as barn swallow (*Hirundo rustica*) and common nighthawk (*Chordeiles minor*), and corvids such as American crow (*Corvus brachyrhynchos*), black-billed magpie (*Pica hudsonia*) and common raven (*Corvus corax*) all inhabit and nest in agricultural fields, cleared areas, or grassy areas and could be found at the Project site.

There have been no wildlife surveys completed for the proposed Project site. A search of the AEP Fish and Wildlife Internet Mapping Tool (AEP 2018) revealed that the site is located within sensitive raptor and sharp-tailed grouse ranges. Moreover, the list of wildlife provided in Table A2-1 in Appendix 2 have been historically observed or detected within the Project site or within 5 km of the site. Table A2-1 also indicates the provincial and federal status and general habitat of each species. In total, 28 species (one amphibian, six mammals, and 21 bird species) have historical occurrences within the Project site or within 5 km of the site. Much of the occurrences are likely due to the proximity of the Project to the Bow River, a major wildlife corridor, Fish Creek Provincial Park, and where agricultural and wetland communities occur east of The City of Calgary.

Many of the species with historical occurrences occupy wetland, riparian, or forested communities (Appendix 2, Table A2-1). As such, most (23 of 28 species) are unlikely to occupy the Project site (Appendix 2, Table A2-1). Based on past industrial and agricultural use of the Project site, there are no riparian or forested vegetation communities remaining. The Level 1 BIA concluded there were no wetlands present in the local study area (i.e. the Green Line) (Tetra Tech 2018). A cursory review of aerial photography conducted by Advisian revealed there may be wetlands of low permanence within the Project area. Given their likely temporary nature and the fact they have been cultivated and are likely impacted by invasive species, the wetland communities likely provide little habitat for wildlife. In addition to the fact that most (23 or 28) species are unlikely to occupy the Project site, northern leopard frogs (*Lithobates pipiens*) are known to be extirpated from Calgary (Government of Alberta 2002). Although some at-risk species can occur in disturbed grassy areas (e.g. short-eared owl [*Asia flammeus*], badger [*Taxidea taxus*], or long-tailed weasel [*Mustela frenata*]), the quality of the habitat, and thus the value of the Project site for these species, is likely low: any use of the site would likely be transitory in nature. Potential risks to wildlife will be mitigated by avoiding development in key

² The ABMI has developed indices for measuring biodiversity across Alberta. Uniqueness is a relative measure that identifies the degree to which a species composition in a 1 square kilometre (km²) grid is distinct compared to other grid cells within a Natural Region.

³ Richness is a relative measure of the number of common native species within 1 km² grid around the province.

⁴ Intactness is a reflection of how modifications to habitat as a result of human activities have resulted in changes to species abundance.

periods (e.g. migratory bird breeding season) and conducting wildlife surveys (e.g. nest searches and general wildlife sweeps) prior to vegetation clearing and construction, if necessary.

5.1.3 Soil Quality

Environmental investigations carried out in 2016 and 2017 (Advisian 2016c, 2017) indicate that Calgary is located east of the Rocky Mountain foothills where glacial and pre-glacial sediment overlays a sedimentary bedrock (the Paskapoo formation) of predominantly fine-grained siltstone and mudstone. The environmental investigation area coincides with the Project footprint (Figure 6).

No historical soil surveys exist for the Project site as soils within Calgary are considered to be disturbed. The Agricultural Region of Alberta Soil Inventory Database (AGRASID) classifies soils within Calgary as being Regosols, which are soils that are weakly developed and lack horizon development (Alberta Soil Information Centre [ASIC] 2015). Historically, the soils were likely Orthic Black Chernozems, as the site was used for agriculture. A 1987 soil survey of the Calgary urban perimeter showed that most soils surrounding the Calgary area were Chernozems and Orthic Black Chernozems were found in the area east of the Project site (MacMillan 1987).

Surficial geology of the Project site is primarily silty clay topsoil to a maximum depth of 0.15 metres below ground surface (mbgs). Fill of unknown origin(s) was observed in three locations at the Project site to a maximum depth of 1.5 mbgs. Geologic material is primarily clay with traces of silt, sand and gravel to a maximum depth of 6.75 mbgs. Bedrock of siltstone was found between 4.2 and 15 mbgs. There was no evidence of soil contamination found during these environmental investigations. All salinity, metals, petroleum hydrocarbons and polycyclic aromatic hydrocarbons concentrations were found to be lower than the laboratory detection limit or less than the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (AEP 2016a) with the exception of EC which was determined to be most likely due to naturally high sulphate concentrations found in Alberta (Advisian 2016c, 2017).

5.1.4 Surface Water and Drainage

There is no surface water on the Project site. The closest surface water body is the Bow River which is located approximately 1.5 km west of the nearest corner of the Project. The project footprint is bounded on all sides by roads (including Deerfoot Trail), open land, or other development. Runoff will be captured through a stormwater management system comprised of a ditching network connected to runoff ponds. The ponds will discharge into The City of Calgary Storm System and will be required to meet the standards outlined in Bylaw No. 47M2016 (The City of Calgary 2005). There is no possibility of runoff reaching the Bow River; there will be no conveyance of sediment or contaminants.

Site topography is generally flat with a gradual slope toward the northwest moving from approximately 1,040 metres above sea level (masl) to 1,030 masl.

5.1.5 Groundwater

Environmental investigations carried out in 2016 and 2017 within the Project footprint (Figure 6; Advisian 2016c, 2017) identified the regional hydrogeology as follows: the regional piezometric surface of the Paskapoo Formation mimics surface topography. There are no regional-scale confined systems. There appears to be a downward hydraulic gradient across the formation, even in the nearby Bow River valley. The Paskapoo

Formation is highly heterogeneous with the hydraulic conductivity of sandstone core samples averaging 10^{-5} m per second (m/s). Intergranular porosity and the influence of fractures can vary widely. The chemistry of groundwater in the Paskapoo is largely influenced by the composition of the glacial deposits.

At the proposed Project site, the depth to shallow groundwater ranged from between 1.27 and 1.97 mbgs, with 40% of the shallow monitoring wells being dry (groundwater flow direction not inferred). The depth to groundwater within bedrock ranged between 1.55 and 4.78 mbgs. The flow of bedrock groundwater is interpreted by Advisian to be in a southwesterly direction toward other commercial/industrial properties that are adjacent to a primary highway (Deerfoot Trail, HWY #2). The presented data was collected in the fall/winter of 2016 and is representative of typically lower groundwater elevations than in the spring/summer.

Chemical analysis revealed several exceedances of the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (AEP 2016a) in both bedrock and overburden groundwater sources for sulphate, manganese, sodium, total dissolved solids, cadmium, selenium and uranium. The concentrations are observed similarly across Calgary and Alberta indicating they are a reflection of natural conditions (Advisian 2017). Nitrite and nitrates in the overburden also exceeded their respective guidelines which is considered to be attributable to historic agricultural activity or adjacent off-site industrial activity (Advisian 2017). There were no exceedances of the applicable guidelines for hydrocarbons and all results were below the laboratory detection limits.

Any groundwater encountered during construction and operation of the Project will be managed according to the ECO Plan to be developed by the contractor and managed by The City of Calgary.

5.1.6 Air Quality and Noise

5.1.6.1 Noise

The Community Standards Bylaw Number 5M2004 (as amended) regulates noise (The City of Calgary 2016b). The Project will comply with the standards to not disturb or annoy a reasonable person, which includes noise from vehicles and motorized equipment for intermittent and continuous periods (The City of Calgary 2016b). The nearest residence is approximately 500 m away (west) and for the most part is buffered by other commercial and industrial businesses as well as a primary highway (Deerfoot Trail, HWY #2) with a sound barrier installed. Given that the location is not within a residential neighborhood, the specific conditions that will apply to the Project construction are as follows:

32. (1) No Person shall cause or permit to be caused a Continuous Sound that exceeds the greater of:

- (a) 85 decibels (dBA) Leq measured over a one-hour period during the Day-time or Night-time; or
- (b) 5 dBA Leq over the Ambient Noise measured over a one-hour period during either the Day-time or Night-time; at any Point of Reception within a Non-Residential Development.

(2) No Person shall, in a Non-Residential Development, cause or permit to be caused a Non-Continuous Sound that exceeds 85 dBA Leq measured over a period of one hour during the Day-time or Night-time where the Point of Reception is within a Non-Residential Development.

The same Bylaw provides allowance to obtain a temporary permit for noise that would otherwise violate the Bylaw, the need for which will be assessed for specific construction activities as required.

Noise generated from the operation of the Project is expected to be minimal as the LRV are electric. Maintenance and wash noise will be limited to operating power tools and will be adequately buffered by the buildings. Train movement around the Project site will be limited to 10 km per hour (km/h) and as such will generate minimal noise.

5.1.6.2 Air Quality

GHG emissions expected from operation and construction are identified in Section 2.4.1. In addition to dust and GHG emissions during construction, fuel combustion from construction equipment will result in emissions of CACs such as NO_x, CO and PM_{2.5}. Construction CAC emissions could result in small detectable quantities of these contaminants relative to background levels. Any occurrences of elevated CAC emissions resulting from Project-related construction activities will be immaterial and short-lived due to the temporal and special characteristics of the Project-related construction activities.

Construction will employ equipment that meets the US Environmental Protection Agency Tier 4 Standards for non-road engines and vehicles (US EPA 2016). It is expected that there will be earth moving equipment including, but not limited to, scrapers, excavators, dump trucks, loaders, bulldozers, cranes, as well as light standards, and generators on-site. Operation of the Project is not expected to produce any major emissions. Under The City of Calgary's Sustainable Building Policy (The City of Calgary 2004) all new City-owned, operated or funded buildings in excess of 500 m² in area must meet or exceed the gold standards of LEED (Leadership in Energy and Environmental Design). As the Project progresses through the design phase, the LEED requirements are applied to all relevant design considerations.

There are several ambient air quality monitoring stations in The City of Calgary. The closest active stations are Calgary Central Inglewood, Calgary Northwest, and Calgary Southeast. Monitored ambient air quality results from these stations are used to represent baseline air quality of the Project area. Substances monitored are CO, nitrogen dioxide (NO₂), SO₂, ozone (O₃) and PM_{2.5}. Results from all three stations are less than the corresponding Alberta Ambient Air Quality Objectives (AAAQOs) except PM_{2.5}. CRAZ indicated that the exceedances of PM_{2.5} at each of the three stations were due to smoke from forest fires.

5.1.7 Historical Resources

An HRIA was completed in 2017 for the Green Line and included the Project footprint (Bison Historical Services 2017). The Project site has not previously been identified to contain or been likely to contain any historical resources including any structure, site, or thing that has a historical, archaeological, paleontological or architectural significance to Indigenous Peoples. Figure 7 shows HRV lands listed relative to the Project footprint. Throughout the Indigenous Group/Community engagement activities, a few concerns were expressed regarding the possibility of chance finds during Project construction. A chance-find protocol will be in place should historical or archeological resources be encountered during the construction phase. Should historical items (as defined by the *Historical Resources Act* [PoA 2016b]) be found, construction will stop, and the find will be reported. Further excavation and treatment will comply with the Alberta *Historical Resources Act*.

5.2 Potential Environmental Effects

The location of the Project site does not make it ideal wildlife habitat, especially considering the past disturbances (agriculture and industrial), surrounding land uses (residential, commercial development, waste

management facilities, and major transportation corridors), and presence of agronomic and invasive vegetation. These factors all contribute to lowering the quality of the habitat present on the Project site and reduce connectivity (at least for terrestrial species) to more natural habitats along the Bow River or outside of The City of Calgary.

Prior to the start of construction, an environmental professional will aid in the large-scale delineation of soil types present on-site for salvage purposes. Soil will be stockpiled with topsoil and subsoil comprising separate piles that are further differentiated by good and fair quality (poor quality will not be salvaged). The resulting stockpiles (to be located off-site) will be seeded to prevent erosion and sedimentation. Soil will be salvaged under appropriate weather conditions such that the quality of the material is not degraded. Seeding will be carried out in accordance with the typical grassy vegetation variations as noted in Section 5.1.1 of this document.

In conjunction with the salvage of subsoil and topsoil, many of the operational activities will take place on concrete surfaces and as such are not anticipated to result in significant soil contamination. Furthermore, the facility will be constructed in such a way as to allow for floor and LRV wash water to be collected within the wastewater management system. Pursuant to the environmental investigations, monitoring wells were installed on the Project site and may serve as monitoring points if (for an unforeseeable reason) they are required in the future. No significant impacts to soils or groundwater are anticipated from construction or operation of the Project.

There are no trees or shrubs on the Project site and as such the potential for nesting birds is reduced to those which are prone to ground nesting. Clearing is expected to begin in Q4 2019 which is outside of the migratory bird nesting season and will avoid potential ground nesting birds. Work planned over the end of April through mid-August (i.e. the migratory birds nesting season for the Project area) in any given year will be carried out in accordance with the results of a wildlife sweep to prevent potential impacts on migratory birds. The sweeps will be designed to identify nesting birds and implement the appropriate mitigation to avoid disruption. Should a nest (or other protected wildlife feature) be encountered during construction, the appropriate buffer will be employed resulting in either the delay of construction or restricted activities on the Project site.

Construction of the Project will employ appropriate techniques to prevent erosion and sedimentation on and off the Project site. Stormwater dry ponds will be utilized to capture and convey stormwater off-site.

Wastewater will be managed separately such that the stormwater ponds will only contain stormwater runoff. The collected runoff will be discharged into The City of Calgary stormwater system in accordance with water quality discharge requirements. Wastewater will be recycled and reused within the wastewater collection system to reduce water use. The wastewater collection system will be connected to The City of Calgary sewer system whereby the small volume (approximately 30%) of wastewater that cannot be recycled will be discharged. Furthermore, there are no surface water features within proximity to the Project that could potentially be impacted; construction and operation of the Project is not anticipated to impact surface water quality.

The Project itself is not anticipated to generate significant air emissions as the buildings are expected to meet or exceed the gold LEED. Noise is not expected to be an operational issue and all construction noise will comply with The City of Calgary Bylaws.

5.2.1 Fish and Fish Habitat

There are no anticipated impacts to fish or fish habitat as a result of the Project. There are no fisheries or fish habitat on the Project site. Wastewater will be directed into the municipal wastewater treatment system and stormwater runoff will be discharged into the municipal stormwater system. Discharges to the wastewater and stormwater systems will be governed by The City of Calgary Bylaws which are protective of aquatic species.

The nearest waterbody supporting fish is the Bow River, which at its closest point is approximately 1.5 km from the western edge of the proposed Project. The Bow River is a prominent watercourse which supports life history stages for many sport fish, coarse fish, and forage fish species, and its importance for aquatic productivity is significant. The provincial Fish and Wildlife Management Information System was consulted, and the list of fish in the database known to be present is extensive (the Bow River is identified by waterbody ID 1988). According to the provincial *Water Act* (PoA 2017a), the Bow River is designated Class C meaning that it is moderately sensitive to disturbance. Spring- and fall-spawning fishes and egg incubation are protected by imposition of a Restricted Activity Period (May 1-July 15 and September 16-April 5) when instream activity should be avoided. The Project includes no activity instream given its distance from the river, and all runoff and water discharge will be directed to municipal collection systems, as indicated. The Project footprint is bounded on all sides by roads (including Deerfoot Trail), open land, or other development. There is no possibility of runoff reaching the Bow River, and erosion will be contained on all sides; there will be no conveyance of sediment or contaminants. It is unlikely that any incremental increase in atmospheric concentrations of particulates or contaminants will be detectable above current inputs from surrounding traffic, industrial activity, and residential communities.

5.2.2 Marine Plants

There are no anticipated impacts to marine plants as a result of the Project. There is no marine environment on or near the Project site. Wastewater will be directed into the municipal wastewater treatment system and stormwater runoff will be discharged into the municipal stormwater system.

5.2.3 Migratory Birds

Given past disturbances, invasive species establishment, and surrounding land uses, migratory bird abundance, diversity, and habitat quality is expected to be low compared to undisturbed and intact communities. Species anticipated to use the site for foraging, resting, and breeding include species common in agricultural and urban environments. Given the lack of tall shrubs and trees, nesting birds are likely those that nest on the ground or in low shrubs. These include species such as savannah sparrow, clay-coloured sparrow, Brewer's blackbird and corvids such as American crow, black-billed magpie, and common raven.

While it is recognized that the Project site does not consist of high quality habitat there is potential for the area to be frequented by migratory birds. As such, the Project has the potential to impact birds through sensory disturbances, direct and indirect mortality, and habitat loss or modification. Despite potential effects and given anticipated low abundance and diversity of bird species, adverse impacts as a result of the Project are anticipated to be negligible and can be mitigated.

There is likely to be some minor increase in sensory disturbances such as noise, vibrations, and light as a result of Project construction and operation. Noise can mask or lead to modification of signals used for communication, mating, and hunting (Siemers and Schaub 2010; Mason et al. 2010) altering foraging or mating success or impacting physiology (e.g. stress or hearing loss; Shannon et al. 2016). These impacts can

ultimately change bird communities (Bayne et al. 2008; Francis et al. 2009). That said, birds can become tolerant to long-term, continuous noise (Shannon et al. 2016). Given that construction will occur in Q4 2019, noise from construction will largely occur outside or prior to the arrival of nesting migratory birds (Environment and Climate Change Canada [ECCC] 2017). Similarly, noise will meet requirements of The City of Calgary Bylaw. Operational noise and vibration is expected to be minimal as the LRV is electric and trains will be limited to a 10 km/h limit within the Project site.

In addition to noise and vibrations, light can also lead to sensory disruption: light can attract and disorient birds disrupting flight paths or inducing behaviours such as territorial singing, thereby increasing energy expenditure leading to reduced survivability, health and fecundity (Longcore and Rich 2004). The increase of light from construction and operations is expected to be negligible compared to surrounding light levels in the adjacent residential, commercial and industrial developments and transportation corridors. Given that the Project site currently is located within a dense, highly impacted inner urban environment, it can be expected that birds inhabiting the wider region are tolerant of current noise, light, and vibration levels.

Direct and indirect mortality could also affect birds as part of Project construction. For example, interactions with construction equipment could lead to mortality (Bishop and Brogan 2013). Construction will be avoided during the breeding bird season, and migratory bird surveys and nest searches will be employed as required to avoid direct interactions with nesting birds. The Project is located in bird nesting Zone B4 and the breeding season for migratory birds is between mid-April and the end of August (ECCC 2017). If vegetation clearing activities and construction fall within the breeding season, a bird nest survey will be conducted to ensure nests and young are protected as required by the MBCA (GoC 1994). If nests are found within the construction area, the appropriate regulatory agencies will be contacted, and a satisfactory plan of action will be developed which will include providing required setbacks from the nest(s) to avoid disturbance until such time as the young have fully fledged. During operation, there will be minimal vehicle traffic and LRV will be moving at low speeds. As such, vehicle collisions during operation are not anticipated to have an impact on migratory birds.

Contaminated air and water could lead to direct and indirect mortality or health and fitness consequences for birds (Cox 1991). For example, dry stormwater ponds built to manage surface runoff have the potential to attract migratory birds following very large storm events. For the most part, these dry ponds will only fill during large storm events when storm sewers are at capacity. Outlet control structures, upstream of discharge locations provide control in managing off-site flow. This flow is restricted to a maximum flow rate release. Once that point has been reached, the dry ponds will fill as needed. It is expected that stormwater quality will meet municipal stormwater discharge limits, as the water is primarily un-impacted rainfall runoff.

During/after large storm events there may be a limited period (i.e. ponds are designed to empty within 24 to 48 hours) when wildlife could be exposed to stormwater within the ponds. In the event of an unforeseen leak/spill of oil and lubricants or gasoline from visiting vehicles, there is the potential for contaminated runoff to reach the stormwater ponds. Immediately following any contaminant detection, a root-cause analysis will be conducted to determine the contaminant source. If the contaminant source was related to a spill, the emergency response plan will be implemented to contain the spill and prevent wildlife from exposure. Such mitigation response which may include, but not be limited to: increased human activity, fladry, visual and audible deterrents, or exclusion fencing. If the source has not been identified as a spill, a wildlife biologist will be consulted to determine what, if any, impacts to wildlife (particularly migratory birds) could be expected. The wildlife biologist will also be consulted to recommend an appropriate mitigation response to be implemented that will be appropriate for the toxicity of the contaminant and the timing of the release. As the ponds will be dry most of the time, access will not be restricted under normal operation and will be similar to dry ponds at other Calgary facilities (e.g. Shepard site and Oliver Bowen Facility).

Air pollution can similarly contribute to direct (acute or chronic toxicity) or indirect mortality (e.g. predation or starvation) and sublethal effects (Cox 1991); however, the Project is expected to have a net positive effect as the Green Line will facilitate emissions reduction. Moreover, all Project buildings are expected to meet or exceed gold LEED standards.

Finally, habitat loss or modification is well known to negatively affect biodiversity, including birds (Fischer and Lindenmayer 2007). However, the Project footprint has undergone previous habitat modification: it has been disturbed by cultivation and industrial development, exotic species have been established, and is situated in an urban environment surrounded by commercial, industrial and residential development. Habitat that is present at the Project site is not limiting on the landscape and is considered to have low uniqueness (ABMI 2018). The habitat available is considered to be of low quality and suitable only for those species that regularly use and are tolerant of conditions in urban areas. Although there will be removal of vegetation and soil leading to a reduction in habitat as part of the development of the Project, this habitat is not limited and surrounding areas will continue to provide space for these species. Construction scheduling (temporal avoidance) will be the primary method of avoiding negative impacts to migratory birds. Soil salvage is scheduled to begin Q4 2019 and as such will not interfere with nesting birds. Should the site be left untouched and subsequent construction be scheduled to begin between April 20 and August 25, bird nest sweeps will be conducted to ensure there are no nesting migratory birds. Any active nests discovered will be buffered appropriately according to the species present. This buffer could result in either construction delays or restricted activities within the Project site.

5.3 Potential Effects Related to Interprovincial/Federal/International Lands

The entire Project area is located in the province of Alberta and The City of Calgary; there are no federal, international or inter-provincial lands involved.

The Project is not located on federal land. The location of the Project relative to federal lands is shown in Figure 5. The Project is not located near a provincial or international border. The location of the Project in relation to provincial and international boundaries is shown in Figure 3. The distance to the boundaries are as follows:

- Alberta-Saskatchewan border: 277 km;
- Alberta-British Columbia border: 84 km;
- Alberta-Northwest Territories border: 1,008 km; and
- Canada-USA border: 215 km.

The closest federal lands are the Tsuut'ina First Nation reserve lands, approximately 12 km west of the Project (Figure 2). Given the distance of the Project to federal lands, it is not anticipated that the off-site dispersion of noise or air emissions will affect those federal lands. Adverse environmental effects are also not anticipated on lands outside of Alberta or Canada.

5.4 Potential Effects on Indigenous Peoples

As noted in Section 5.1.7 there are no anticipated historically significant or archeological resources on the Project site and likely no current land use by Indigenous Peoples. The HRIA completed in 2017 found that the Project site has not previously been identified to contain or been likely to contain any historical resources including any structure, site, or thing that has a historical, archaeological, paleontological or architectural significance to Indigenous Peoples (Bison Historical Services 2017). Furthermore, the Project site is not near or directly adjacent to designated First Nation Reserve Lands. For this reason, Project development is not likely to have environmental, socio-economic, physical, historical or cultural impacts on Indigenous Peoples. However, it is understood that the traditional territories of a number of Indigenous Groups/Communities overlap with the Project site. Throughout the Indigenous Group/Community engagement process, a few concerns were expressed regarding the possibility of chance finds during Project construction and for this reason a chance-find protocol will be in place should historical or archeological items be found during Project site development. Should historical items (as defined by the *Historical Resources Act* [PoA 2016b]) be found, construction will stop, and the find will be reported. Further excavation and treatment will comply with the *Alberta Historical Resources Act*. Through the engagement process, the Blood Tribe expressed that they would like to hold a ceremony prior to construction. As such, a tobacco offering ceremony was held on October 30, 2018. The Indigenous Groups/Communities engagement process currently underway will provide additional opportunity for concerns regarding potential effects to be brought forward.

The City of Calgary has developed targets which stipulate that in Calgary "...all public institutions and systems create and implement an urban Indigenous policy that recognizes the detrimental colonial history experienced by First Nations, Métis and Inuit people; reduces barriers to public participation and governance; and supports economic, social and political advancement" (imagineCALGARY 2006). Pursuant to this stipulation, The City of Calgary is aiming to "develop a targeted approach to decrease the social exclusion experienced by First Nations, Métis and Inuit individuals and communities; symptoms are often manifested by poverty, a low sense of community, lack of employment, low levels of education and crime" (imagineCALGARY 2006). In contribution to this effort The City of Calgary uses a sliding scale for transit fares structured to support low income access to community services and facilitate participation (The City of Calgary 2017d). The implementation of the Green Line is expected to increase access for low income areas of The City of Calgary, connecting them with social services and areas of high employment. The Project as a component of the Green Line will serve to improve the condition of citizens of Calgary, Indigenous Groups/Communities included.

6. Engagement with Indigenous Groups/Communities

6.1 Potentially Interested or Affected Groups/Communities

A list of the Indigenous Groups/Communities potentially interested in the Project was provided by CEAA:

- Alberta
 - Siksika Nation
 - Stoney Nakoda Nations (Bears paw First Nation, Chiniki First Nation and Wesley First Nation)
 - Tsuut'ina Nation
 - Blood Tribe
 - Ermineskin Cree Nation
 - Foothills Ojibway First Nation
 - Louis Bull First Nation
 - Montana First Nation
 - Piikani Nation
 - Samson Cree Nation
 - Métis Nation of Alberta – Region 3
 - Métis Nation of Alberta
- British Columbia
 - Ktunaxa Nation (?Akisq'nuk First Nation, ?aqam First Nation, Lower Kootenay First Nation, Tobacco Plains First Nation)
 - Shuswap Indian Band

See Figure 5 for relative locations of Indigenous Groups/Communities with respect to the Project. The list of potentially interested parties was provided by CEAA and is based on the proximity of reserve lands to the Project area, traditional territory that overlaps with the Project area, and traditional harvesting zones that overlap or are in close proximity with the Project area.

6.2 Indigenous Groups/Communities Engagement

Section 1.3 outlines the initial Indigenous Groups/Communities engagement that took place for the Green Line under Alberta Culture and Tourism, which included the Project. Each Indigenous Group/Community that was involved in the initial engagement provided letters of non-objection to the southeast leg of the Green Line.

Section 1.3 also includes a summary of the secondary Indigenous Groups/Communities engagement that took place for the Project with direction from CEAA.

Section 6.1 lists the Indigenous Groups/Communities that were recommended for engagement by CEAA (Tiege 2018b, pers. comm.) as specifically related to this Project Description. These groups were sent a notification letter outlining the proposed Project as it relates to the Green Line. Engagement was executed by Bison Historical Services as was done for the original engagement program.

6.3 Indigenous Groups/Communities Concerns

During the initial round of engagement, no concerns were raised that were specific to the Project site. The City of Calgary provided tours of the Green Line which included the portion of the alignment containing the Project site. Following traditional knowledge site visits hosted by The City of Calgary/Bison Historical Services, all groups provided a letter of non-objection to the Green Line.

To date, eight of the 21 groups identified for notification by CEAA have requested meetings with The City of Calgary in response to the notification packages delivered on July 30, 2018. These groups include: Métis Nation of Alberta – Region 3, Montana First Nation, Samson Cree Nation, Siksika Nation, Blood Tribe, Tsuut'ina Nation, Stoney Nakoda Nations and Ermineskin Cree Nation. Three of the eight groups who responded to the notification package expressed concerns about potential archaeological significance at the Project site. The City of Calgary responded by hosting site tours, by providing the archaeological assessment report and by committing to following a chance-find protocol during construction as required. Should historical items (as defined by the *Historical Resources Act* [PoA 2016b]) be found, construction will stop, and the find will be reported. Further excavation and treatment will comply with the *Alberta Historical Resources Act*.

Should any concerns be issued by other groups they will likely be addressed in a manner similar to those of the originally engaged Indigenous Groups/Communities which included further conversation, meetings and site tours.

The City of Calgary will maintain ongoing engagement as required to follow up on action items resulting from meetings held with Indigenous Groups/Communities. Furthermore, The City of Calgary will continue to engage Indigenous Groups/Communities by providing the results of any historical findings during Project construction. The Green Line Community Engagement Group will develop an engagement schedule to coincide with the start of construction.

7. Engagement with the Public and Other Parties

7.1 Key Comments and Concerns

An extensive engagement process was carried out for the Green Line. While there was much discussion surrounding community development and future transit plans, there was no specific discussion of the Project or its development highlighted by community members. For this reason, there are no key concerns or comments in relation to the Project.

7.2 Ongoing or Proposed Stakeholder Engagement

The City of Calgary has developed an Engage Policy (Customer Service and Communications 2013) which outlines the responsibilities for public engagement and provides the guidelines for the engagement process.

The City of Calgary will maintain the ongoing engagement programs which target each neighbourhood along the Green Line alignment where any person or stakeholder including Indigenous Peoples are welcome to attend. The Green Line Community Engagement Group will develop an engagement schedule to coincide with the start of construction.

7.3 Engagement with Other Jurisdictions

Regulatory engagement is noted in Section 1.3. The outcome of engagement with these jurisdictions was that there are no environmental assessment or regulatory decision implications for the Project. The engagement noted in Section 1.3 involved the following correspondence:

- 29-Sep-2015: meeting with The City of Calgary and Alberta Culture and Tourism regarding the issuance of a Schedule A document providing a list of appropriate contact for information regarding Indigenous Traditional Use Site of Significance;
- 2017: various internal (The City of Calgary) discussions to confirm the municipal permitting requirements;
- 23-Nov-2017: meeting with The City of Calgary and AEP regarding the confirmation of no provincial EIA requirement; and
- 29-Nov-2017: meeting with The City of Calgary (Evan Kortje, Simone Fraser, David Mercer, Ethan Askey) and Infrastructure Canada (Eli Arkin, Danielle Paul) to discuss engagement to date with Stoney Nakoda Nations and Métis Nation of Alberta – Region 3.

8. References

- ABMI, 2018. Available at: <http://www.abmi.ca/home.html>.
- Advisian, 2016a. Environmental Review PRV-218 Telsec Property Corporation (12725 52 Street SE). Calgary: Screening Level Environmental Site Assessment for The City of Calgary Sales, Acquisitions and Leases Environmental (S.A.L.E) Policy.
- Advisian, 2016b. Phase II Environmental Site Assessment, Southeast Leg of the Green Line Stage Three. Calgary: The City of Calgary.
- Advisian, 2016c. Environmental Review PRV-216 First Alliance Church (12345 40 Street SE). Calgary: Screening Level Environmental Site Assessment for The City of Calgary Sales, Acquisitions and Leases Environmental (S.A.L.E) Policy.
- Advisian, 2017. Limited Phase II Environmental Site Assessment: Southeast Leg of the Green Line Stage Three. Calgary: The City of Calgary.
- AEP (Alberta Environment and Parks), 2015. Natural Regions and Subregions of Alberta. A Framework for Alberta Parks. Edmonton: Alberta Tourism Parks and Recreation.
- AEP (Alberta Environment and Parks), 2016a. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Edmonton: Alberta Environment and Parks, Land Policy Branch.
- AEP (Alberta Environment and Parks), 2016b. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Edmonton: Alberta Environment and Parks, Lands Policy Branch.
- AEP (Alberta Environment and Parks), 2016c. Alberta Exposure Control Guide. Edmonton: Alberta Environment and Parks, Land Policy Branch.
- AEP (Alberta Environment and Parks), 2018. Fish and Wildlife Internet Mapping Tool - Public. Available at: https://maps.alberta.ca/FWIMT_Pub/Viewer/?TermsOfUseRequired=true&Viewer=FWIMT_Pub. Retrieved March 26, 2018.
- ASIC (Alberta Soil Information Centre), 2015. AGRASID (Agricultural Region of Alberta Soil Inventory Database) Version 4.1. Alberta Soil Information Viewer. Available at: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/sag10372](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sag10372). Accessed October 22, 2018.
- Bayne, E.M., L. Habib, and S. Boutin. 2008. Impacts of Chronic Anthropogenic Noise from Energy-Sector Activity on Abundance of Songbirds in the Boreal Forest. *Conservation Biology*. 22(5): 1186-1193.
- Bishop, C.A. and J.M. Brogan. 2013. Estimates of Avian Mortality Attributed to Vehicle Collisions in Canada. *Avian Conservation and Ecology*. 8(2): 2.
- Bison Historical Services, 2017. Final Report Historical Resource Impact Assessment, City of Calgary Green Line LRT Project – Southeast Segment. Calgary: The City of Calgary.
- Calgary Transit, 2004. Secondary Containment Guidelines. No. S-SP-G-0004. Current to May 31, 2016.

- CCME (Canadian Council of Ministers of the Environment), 2003. Environmental Code of Practice for Aboveground and Underground Storage Tank Systems containing Petroleum and Allied Petroleum Products, PN 1326. Winnipeg.
- The City of Calgary, 2004. Sustainable Building Policy, CS005, UE2004-43. Calgary: Infrastructure and Information Services.
- The City of Calgary, 2005. Bylaw Number 47M2016 Being a Bylaw of The City of Calgary to Regulate Storm Sewers and Storm Drainage in the City of Calgary. The Council of The City of Calgary.
- The City of Calgary, 2012. Bylaw Number 45M2016 Being a Bylaw of The City of Calgary to Regulate Wastewater. The Council of The City of Calgary.
- The City of Calgary, 2013. Municipal Development Plan, Office of Consolidation 2017. The City of Calgary.
- The City of Calgary, 2016a. Code of Practice for Drainage Activities. Calgary: The City of Calgary.
- The City of Calgary, 2016b. Community Standards Bylaw 5M2004 (as amended). Calgary: The City of Calgary.
- The City of Calgary, 2017a. Document Library - Southeast Public Engagement Reports. Available at: <http://www.calgary.ca/Transportation/TI/Pages/Transit-projects/Green-line/document.aspx>. Retrieved March 16, 2018.
- The City of Calgary, 2017b. The City of Calgary's Environmental and Safety Management. Available at: <http://www.calgary.ca/UEP/ESM/Pages/Environmental-Management.aspx>. Retrieved March 15, 2018.
- The City of Calgary, 2017c. EnviroSystem. Available at: <http://www.calgary.ca/UEP/ESM/Pages/Our-Environmental-Management-System/EnviroSystem.aspx>. Retrieved March 15, 2018.
- The City of Calgary, 2017d. Calgary Transit Low Income Monthly Pass Sliding Scale Fare Changes. Available at: <http://www.calgary.ca/CSPS/CNS/Pages/Neighbourhood-Services/sliding-scale-fare-changes.aspx>. Retrieved March 28, 2018.
- The City of Calgary, 2019. Community-wide Greenhouse Gas (GHG) Inventory. Available at: <https://data.calgary.ca/Environment/Community-wide-GHG-Inventory-By-Sector/tp2j-ztyy>
- Cox, C., 1991. Pesticides and Birds: From DDT to Today's Poisons. Journal of Pesticide Reform. 11(4):2-6.
- CRAZ (Calgary Region Air Zone), 2014. Calgary Region Airshed Zone Particulate Matter and Ozone Management Plan. Available at: <http://craz.ca/documents/#Documents%2FPMO3-Management-Plan>: CRAZ.
- Customer Service and Communications, 2013. Engage Policy CS009 PFC2013-0235. Calgary: The City of Calgary.
- Downing, D.J. and W. W. Pettapiece, 2006. Natural Regions and Subregions of Alberta. Natural Regions Committee, Government of Alberta, Alberta. 2006.

- ECCC (Environment and Climate Change Canada), 2017. General nesting periods of migratory birds. Available at: <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html>. Accessed: October 2018.
- Fischer, J. and D.B. Lindenmayer. Landscape Modification and Habitat Fragmentation: A Synthesis. *Global Ecology and Biogeography*. 16:265-280.
- Francis, C.D., C.P. Ortega, and A. Cruz. 2009. Noise Pollution Changes Avian Communities and Species Interactions. *Current Biology*. 19(16):1415-1419.
- Government of Alberta, 2002. Alberta Northern Leopard Frog Recovery Plan 2010-2015. Prepared for Alberta Environment and Sustainable Resource Development. Alberta Species at Risk Recovery Plan. No. 20. Edmonton, AB. 34pp
- GoC (Government of Canada), 1985. Fisheries Act R.S.C., c. F-14. Available at: <http://laws-lois.justice.gc.ca/eng/acts/f-14/>.
- GoC (Government of Canada), 1994. MCBA; Migratory Birds Convention Act (S.C.1994 c.22). Ottawa: Minister of Justice.
- GoC (Government of Canada), 2018a. Regulations Designating Physical Activities SOR/2012-147. Available at: <http://laws-lois.justice.gc.ca/PDF/SOR-2012-147.pdf>. Published by the Minister of Justice.
- GoC (Government of Canada), 2018b. Canadian Environmental Assessment Act S.C.2012. Available at: <http://laws-lois.justice.gc.ca/PDF/C-15.21.pdf>. Published by the Minister of Justice.
- GoC (Government of Canada), 2018c. Railway Safety Act R.S.C 1985. Available at: <http://laws-lois.justice.gc.ca/PDF/R-4.2.pdf>. Published by the Minister of Justice.
- GoC (Government of Canada), 2018d. Transportation of Dangerous Goods Act S.C. 1992. Available at: <http://lois-laws.justice.gc.ca/PDF/T-19.01.pdf>. Published by the Minister of Justice.
- imagineCALGARY, 2006. Calgary's Plan for Long Range Urban Sustainability. Calgary: The City of Calgary.
- Land Use Bylaw Sustainment Team, Development and Building Approvals, Planning Implementation, 2008. Land Use Bylaw IP2007. Calgary: The City of Calgary.
- Longcore, T. and C. Rich, 2004. Ecological Light Pollution. *Frontiers in Ecology and Environment*. 2(4): 191-198.
- MacMillan, R.A., 1987. Soil survey of the Calgary urban perimeter. Bulletin No. 54. Alberta Research Council. 1987.
- Mason, J.T., C.J.W. McClure, and J.R. Barber. 2016. Anthropogenic Noise Impairs Owl Hunting Behavior. *Biological Conservation*. 199:29-32.
- Nautilus Paleontology Inc., 2016. The palaeontological Historical Resources Impact Assessment of the City of Calgary Green Line Southeast Transitway (C-Trainline) (GL-SE) Rail Project. NPI Report No. 2016-03, RTMP Permit No. 2016-007 and 2015-087, ACT HRA Requirements Project File: 4715-15-0024-001. October 28, 2016.

- PoA (Province of Alberta), 1993. Environmental Protection and Enhancement Act, Environmental Assessment (Mandatory and Exempted Activities) Regulation. Alberta Regulation 111/1993.
- PoA (Province of Alberta), 2008. Weed Control Act W-5.1. Edmonton: Alberta Queens Printer.
- PoA (Province of Alberta), 2010. Railway (Alberta) Act 2000 C.R-4. Edmonton: Alberta Queens Printer.
- PoA (Province of Alberta), 2013. Alberta Land Stewardship Act, Statutes of Alberta 2009 C. A-26.8. Edmonton: Alberta Queens Printer.
- PoA (Province of Alberta), 2014a. South Saskatchewan Regional Plan 2014-2024. <https://landuse.alberta.ca/LandUse.ca>: Alberta Government.
- PoA (Province of Alberta), 2014b. South Saskatchewan Region Air Quality Management Framework. Edmonton: Government of Alberta.
- PoA (Province of Alberta), 2014c. South Saskatchewan Region Surface Water Quality Management Framework. Edmonton: Government of Alberta.
- PoA (Province of Alberta), 2016a. Lubricating Oil Material Recycling and Management Regulation 82/1997. Edmonton: Alberta Queens Printer.
- PoA (Province of Alberta), 2016b. Historical Resources Act RS.2000 C.H-9. Edmonton: Alberta Queens Printer.
- PoA (Province of Alberta), 2017a. Water Act, Revised Statutes of Alberta 2000 C. W-3. Edmonton: Alberta Queens Printer.
- PoA (Province of Alberta), 2017b. Environmental Protection and Enhancement Act C. E-12. Edmonton: Alberta Queen's Printer.
- PoA (Province of Alberta), 2017c. Activities Designation Regulation 276/2003. Edmonton: Alberta Queens Printer.
- PoA (Province of Alberta), 2017d. Too Good to Waste, Making Conservation a Priority. Available at: <http://aep.alberta.ca/waste/documents/TooGoodToWaste-Oct2007.pdf>. Retrieved March 16, 2018.
- PoA (Province of Alberta), 2018. Municipal Government Act. Revised Statutes of Alberta 2000 Chapter M-26.
- Shannon, G., M.F. McKenna, L.M. Angeloni, K.R. Crooks, K.M. Fristrup, E. Brown, K.A Warner, M.D. Nelson, C. White, J. Briggs, S. McFarland, and G. Wittemyer. 2016. A Synthesis of Two Decades of Research Documenting the Effects of Noise on Wildlife. *Biological Reviews*. 91:982-1005.
- Siemers, B.M. and A. Schaub. 2010. Hunting at the highway: traffic noise reduces foraging efficiency in acoustic predators. *Proceedings of the Royal Society B: Biological Sciences*. 278(1712):1-7
- Tetra Tech (Tetra Tech Canada Inc.), 2018. Level 1 Biophysical Impact Assessment – Preliminary Natural Site Assessment Green Line LRT, Douglas Glen Station to Shepard Station Extension and Enabling Works Projects. June 29, 2018.

The City of Calgary

Canadian Environmental Assessment Agency Summary of a Project Description
Green Line Maintenance and Storage Facility



Tiege, S., 2018a. CEAA Designated Project Description Overview Meeting (The City of Calgary, Interviewer).
March 20, 2018.

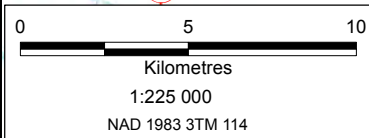
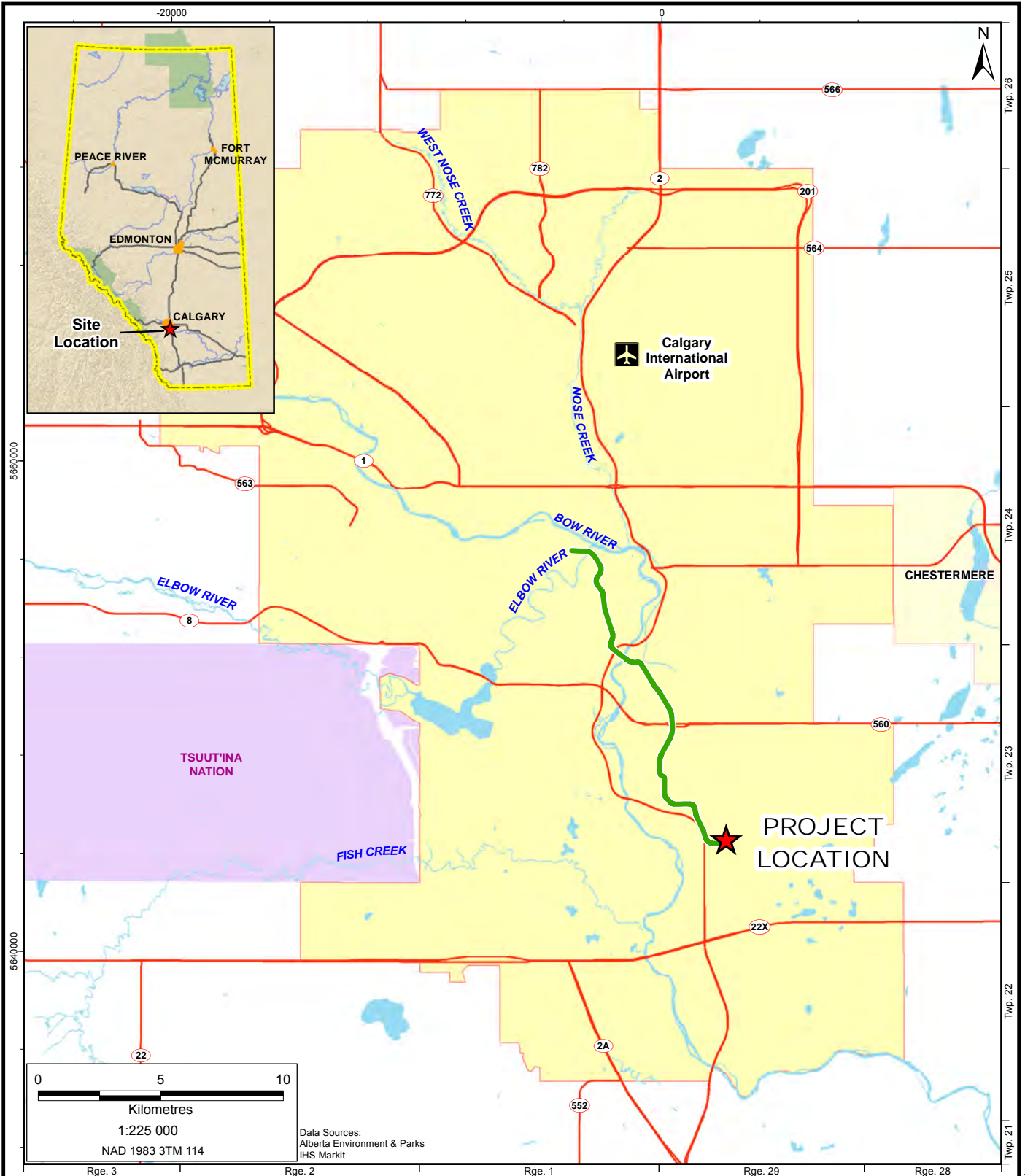
Tiege, S., 2018b. Subject: City of Calgary Green Line LRT - First Nations Consultation. March 14, 2018.

US EPA (United States Environmental Protection Agency), 2016. Emission Standards Reference Guide, EPA
Emission Standards for Nonroad Engines and Vehicles. USA Federal Office of transportation and Air
Quality.

UNFCCC, 2018. Canada's National Inventory Report. Available at: <https://unfccc.int/documents/65715>.
Accessed July 2018.

Figures





Data Sources:
 Alberta Environment & Parks
 iHS Market

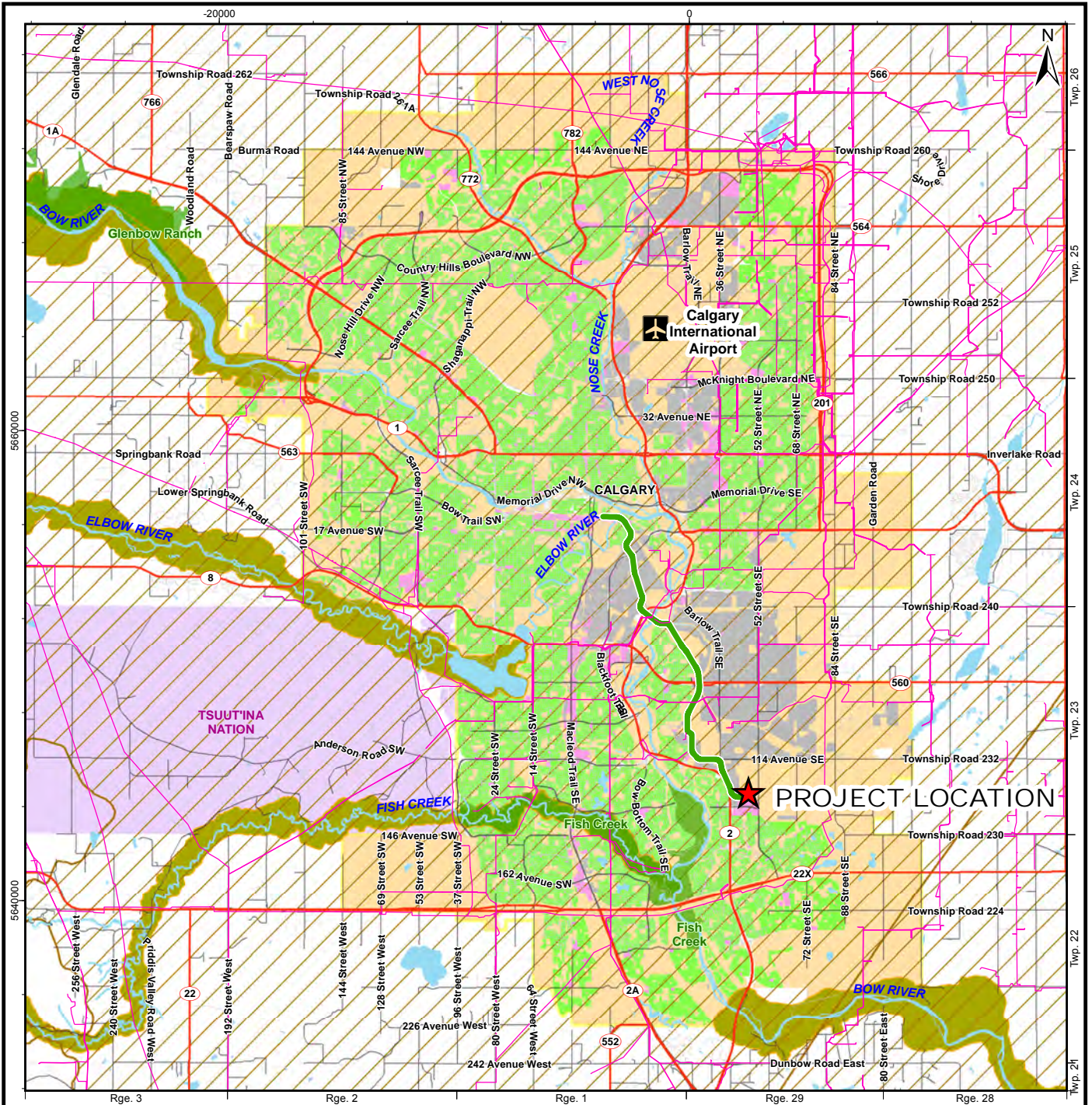
- Project Location
- Green Line South East
- Calgary
- Tsuut'ina Nation
- Communities
- Waterbody
- Watercourse
- Major Road

THE CITY OF CALGARY
GREEN LINE MAINTENANCE AND STORAGE FACILITY
CEAA PROJECT SUMMARY

PROJECT LOCATION MAP

	Date: 15-JAN-19	Drawn by: T.G.	Edited by: T.G.	App'd by: G.R. . .
	WorleyParsons Project No. 307074-02081-800			
	FIG No. 1			REV A

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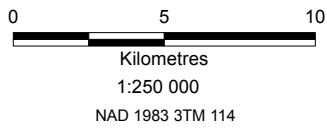


- Project Location
- Green Line South East
- Calgary
- Tsuut'ina Nation
- Provincial Parks and Protected Areas
- Land Use**
- Commercial
- Residential
- Industrial
- Recreational/Mixed Use/Public Infrastructure
- Key Wildlife and Biodiversity Zone
- Sensitive Raptor Range
- Waterbody
- Watercourse
- High Pressure Pipelines
- Major Road
- Collector Road
- Local Road

Data Sources:
 Alberta Environment & Parks
 IHS Market
 City of Calgary

THE CITY OF CALGARY
GREEN LINE MAINTENANCE AND STORAGE FACILITY
CEAA PROJECT SUMMARY

REGIONAL FEATURES AND LOCATION MAP



Date: 15-JAN-19	Drawn by: T.G.	Edited by: T.G.	App'd by: G.R.
WorleyParsons Project No. 307074-02081-800			
FIG No 2	REV A		

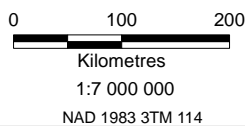
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★ Project Location

Data Sources:
IHS Markit



THE CITY OF CALGARY
GREEN LINE MAINTENANCE AND STORAGE FACILITY
CEAA PROJECT SUMMARY

PROJECT LOCATION RELATIVE TO PROVINCIAL AND
INTERNATIONAL BOUNDARIES

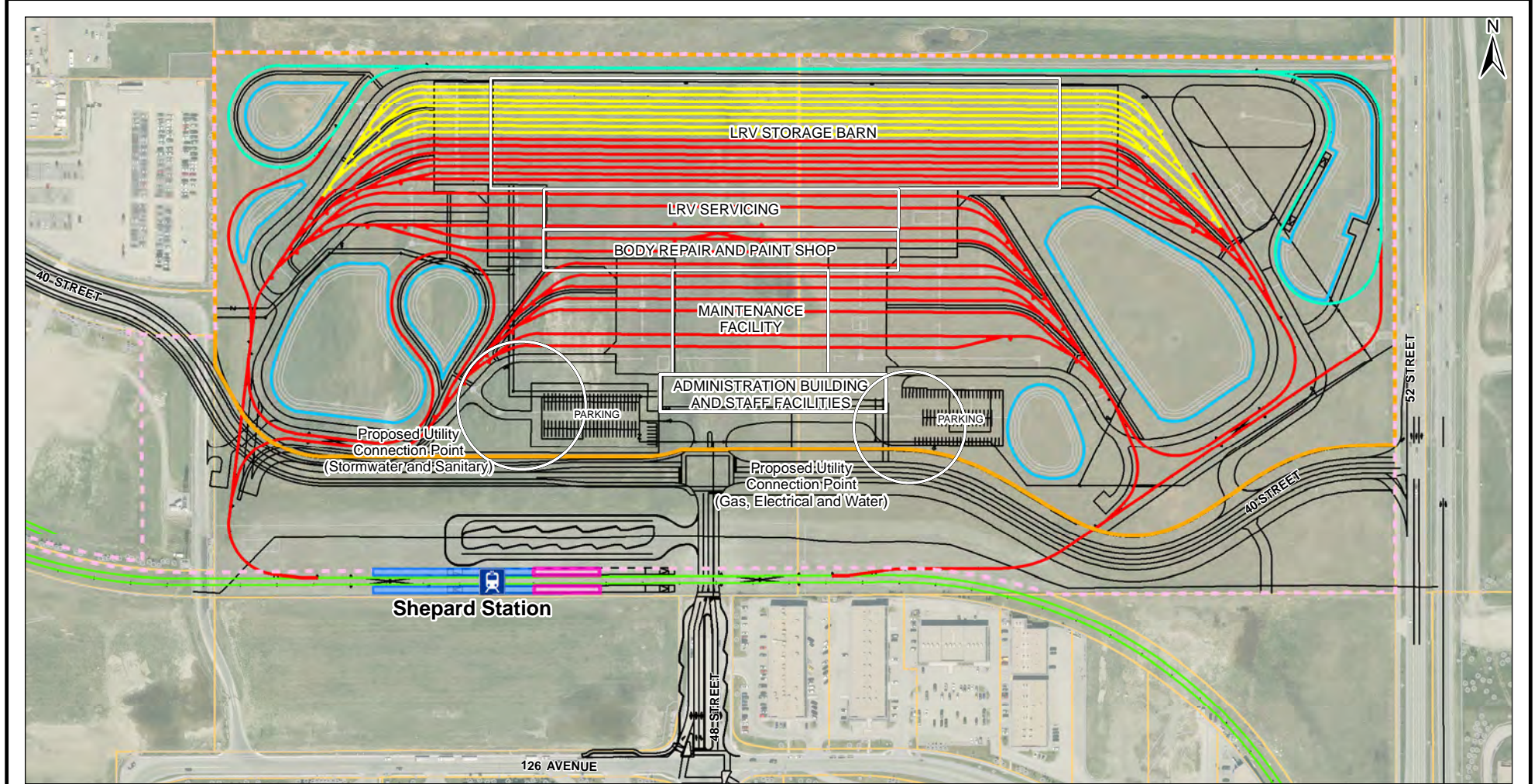
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to zero harm



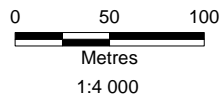
Advisian
WorleyParsons Group

Date:	15-JAN-19	Drawn by:	T.G.	Edited by:	T.G.	App'd by:	G.R.
WorleyParsons Project No.				307074-02081-800			
FIG No.					3		REV
							A

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- Proposed Station
- Proposed Platform
- Proposed Platform - future
- Project Footprint
- Ownership Parcel
- Proposed Green Line Track
- Proposed Yard Track
- Future Yard Track
- Test Track
- Proposed Stormwater Pond Location
- Property Line/Legal Boundary

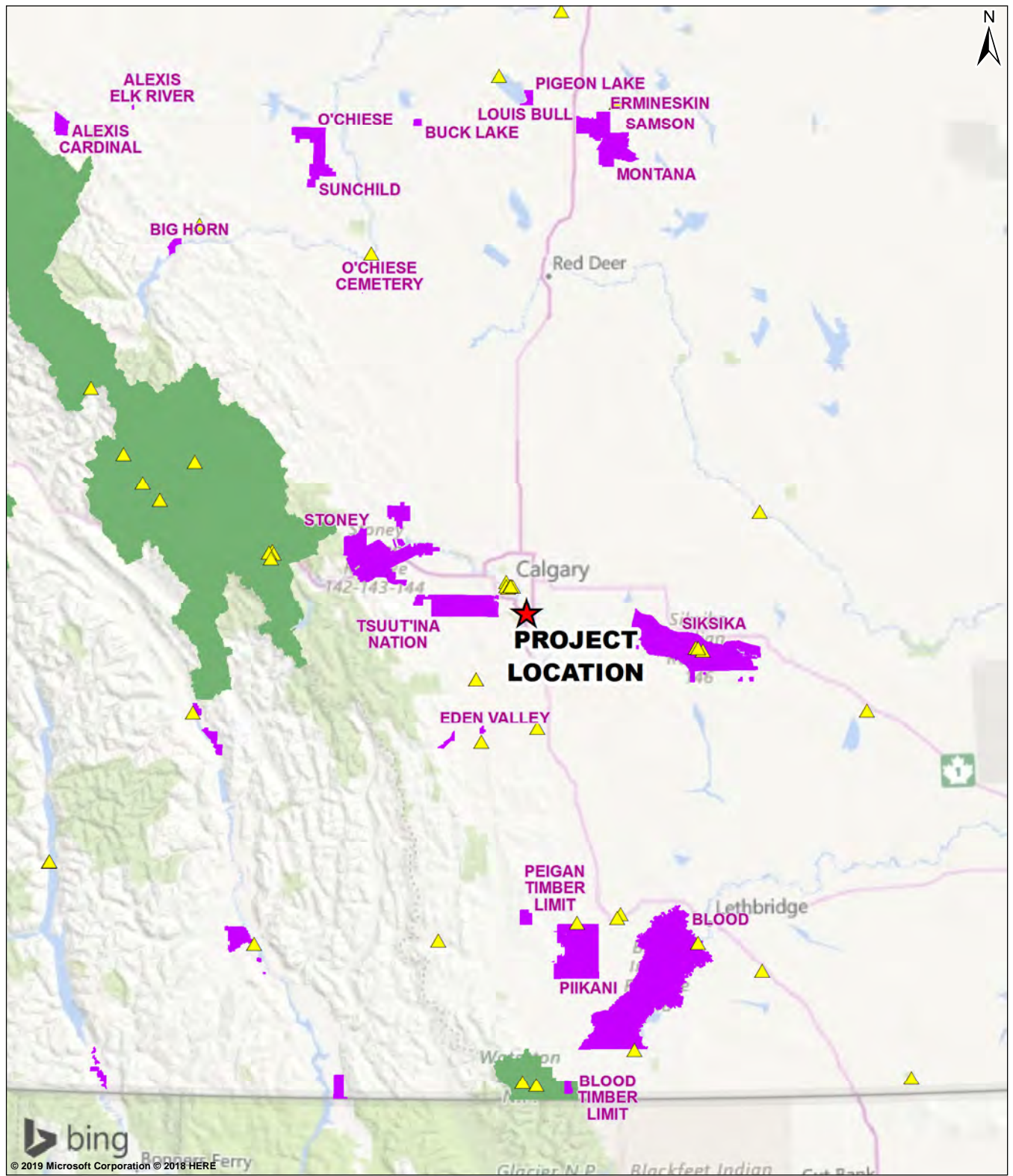


Data Sources:
 The City of Calgary, 2014.
 Road network provided by IHS Markit, 2014.
 Imagery Source: City of Calgary, 2018.

THE CITY OF CALGARY
GREEN LINE MAINTENANCE AND STORAGE FACILITY
CEEA PROJECT SUMMARY

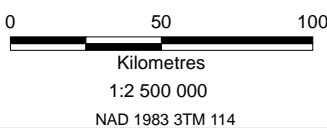
PROJECT LAYOUT

Date:	15-JAN-19	Drawn by:	T.G.	Edited by:	T.G.	App'd by:	G.R.
		WorleyParsons Project No. 307074-02081-800				FIG No. 4	
		WorleyParsons Group		REV A			
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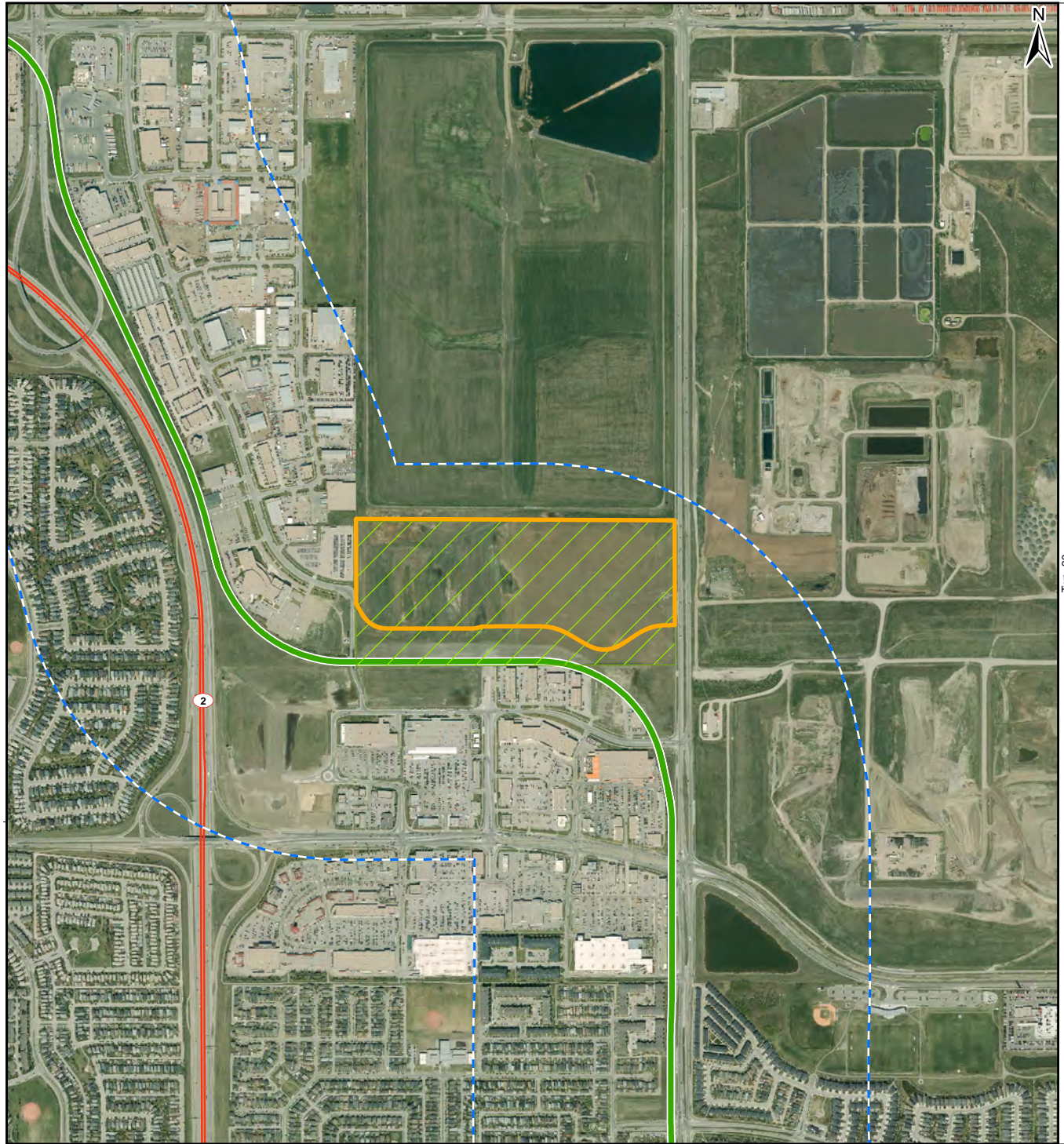







- Project Location
- Reserve Lands of Indigenous Groups
- National Park
- National Historic Site

Data Sources:
IHS Markit

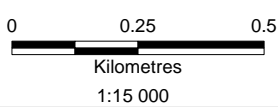




<p>THE CITY OF CALGARY GREEN LINE MAINTENANCE AND STORAGE FACILITY CEAA PROJECT SUMMARY</p>			
<p>LOCATION OF FEDERAL LANDS RELATIVE TO THE PROPOSED PROJECT FOOTPRINT</p>			
	<p>Date: 15-JAN-19</p>	<p>Drawn by: T.G.</p>	<p>Edited by: T.G.</p>
		<p>App'd by: G.R.</p>	
		<p>WorleyParsons Project No. 307074-02081-800</p>	
		<p>FIG No 5</p>	<p>REV A</p>
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-  Project Footprint
-  Green Line South East
-  Major Road
-  Environmental Investigation Area
-  Biophysical Assessment Area

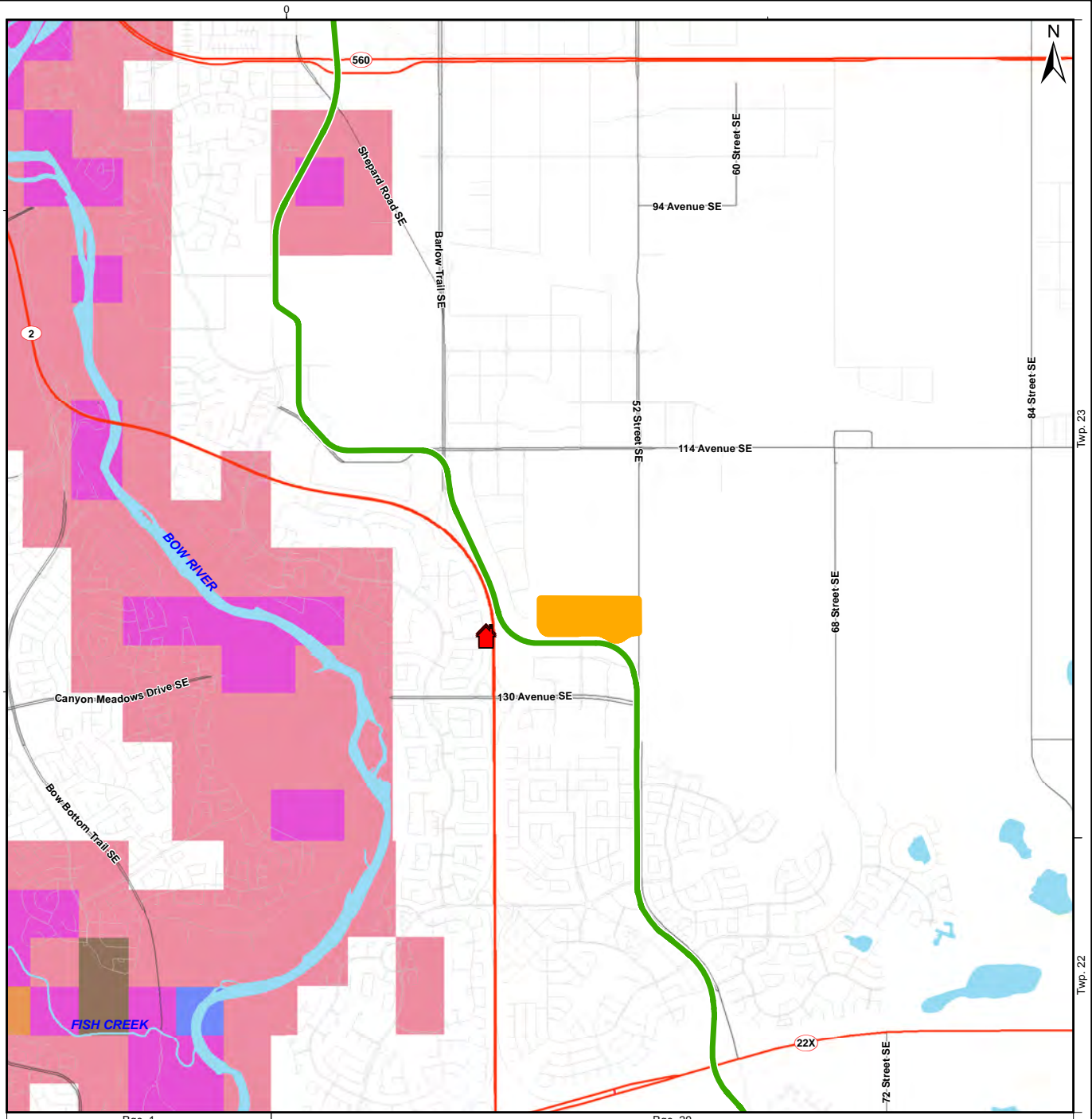
Data Sources:
 Alberta Environment & Parks
 IHS Markt
 City of Calgary



<p>THE CITY OF CALGARY GREEN LINE MAINTENANCE AND STORAGE FACILITY CEAA PROJECT SUMMARY</p>			
<p>ENVIRONMENTAL INVESTIGATION AND BIOPHYSICAL ASSESSMENT AREAS</p>			
Date:	15-JAN-19	Drawn by:	T.G.
		Edited by:	T.G.
		App'd by:	G.R.
<p>WorleyParsons Project No. 307074-02081-800</p>			
			
<p>Oneway to zero harm</p>		<p>Advisian WorleyParsons Group</p>	
<p><small>*This drawing is prepared solely for the use of our customers as specified in the accompanying report. WorleyParsons Canada Services Ltd. assumes no liability to any other party for any representations contained in this drawing.*</small></p>		FIG No <p style="text-align: center;">6</p>	REV <p style="text-align: center;">A</p>

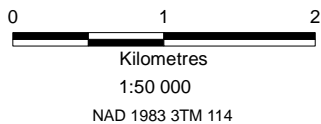
Twp. 23

USER NAME: Tom.Graham
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 ISSUING OFFICE: CALGARY GIS



- Project Footprint
- Waterbody
- Major Road
- Historic Resources**
- Green Line South East
- Watercourse
- Collector Road
- 5, a
- 3, a
- Local Road
- 4, a
- 1, h
- Nearest Residence
- 3, p

Data Sources:
 Alberta Environment & Parks
 IHS Markt
 City of Calgary



THE CITY OF CALGARY
GREEN LINE MAINTENANCE AND STORAGE FACILITY
CEAA PROJECT SUMMARY

NEAREST RESIDENCES AND HISTORICAL RESOURCES

Date:	15-JAN-19	Drawn by:	T.G.	Edited by:	T.G.	App'd by:	G.R.
				WorleyParsons Project No.			
				307074-02081-800			
FIG No					REV		
7					A		



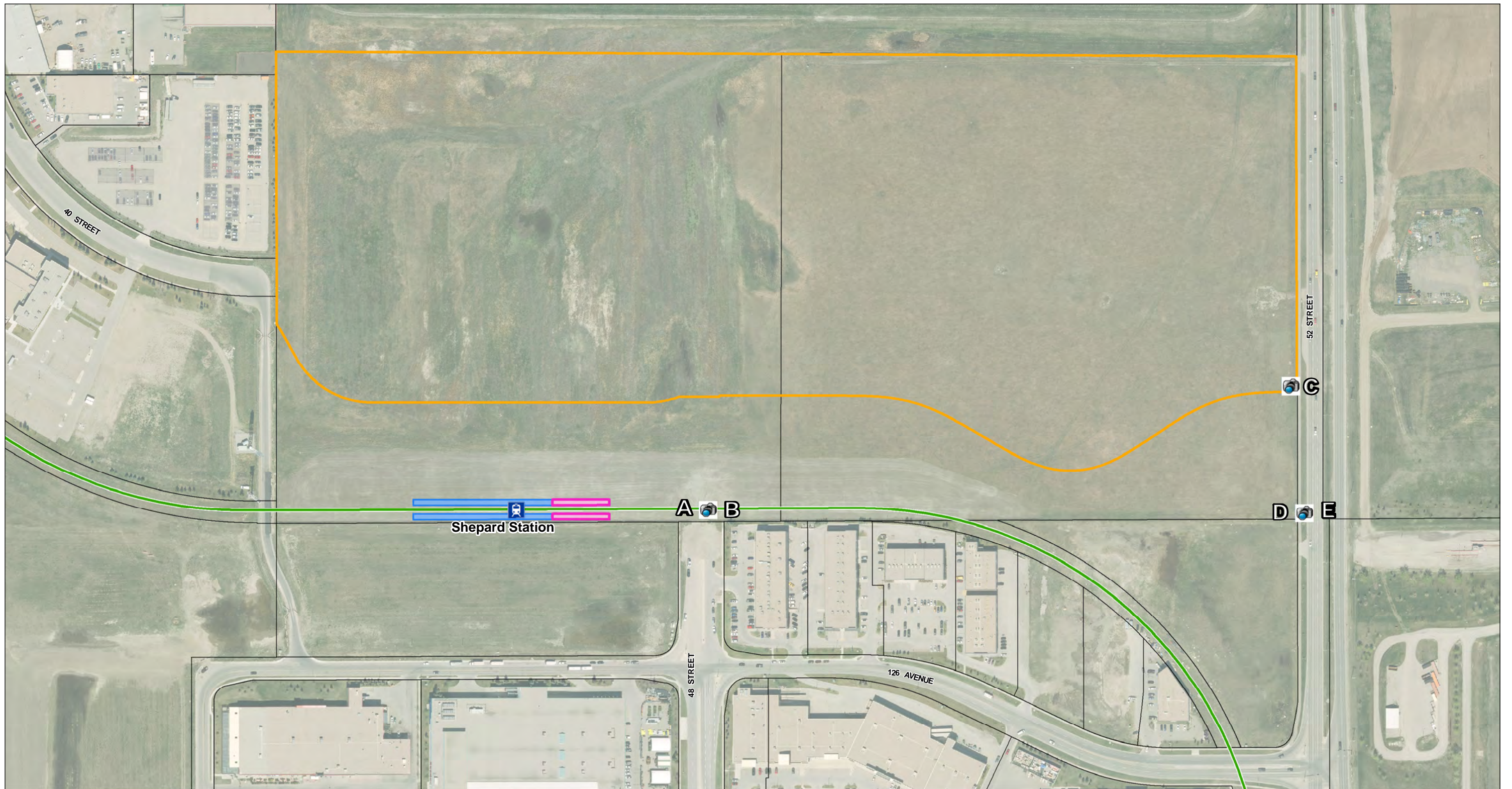
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Appendices



Appendix 1 Project Location Photographs

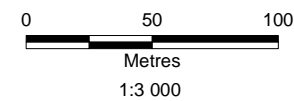




- Proposed Green Line Track
- Photo Location
- Proposed Station
- Proposed Platform
- Proposed Platform - future
- Project Footprint
- Ownership Parcel

Data Sources:
 The City of Calgary, 2014.
 Road network provided by IHS Markit, 2014.
 Imagery provided by City of Calgary, 2018.

FILE LOCATION: N:\PROJECTS\City_Calgary\Greenline\MXD\307074-02081.800\MSF CEEA Project Summary\Appendix 1\PhotoLocations_RevA.mxd



THE CITY OF CALGARY GREEN LINE MAINTENANCE AND STORAGE FACILITY CEEA PROJECT SUMMARY			
PHOTO LOCATIONS			
Date: 15-JAN-19	Drawn by: T.G.	Edited by: T.G.	App'd by: . . .
		WorleyParsons Project No. 307074-02081-800	
FIG No A1-1		REV A	
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Appendix 1 Site Location Photographs

Figure A1-A Facing North West



Figure A1-B Facing North East



Figure A1-C Facing West



Figure A1-D Facing West



Figure A1-E Facing West-Northwest



Appendix 2 Historical Wildlife Occurrences



Appendix 2 Historical Wildlife Occurrences

Table A2-A Wildlife with Historical Occurrences within 5 km of the Proposed Site

Common Name	Species Name	Alberta General Status ¹	COSEWIC ²	SARA ³	General Habitat	Presence of Habitat
Amphibian						
Northern leopard frog	<i>Lithobates pipiens</i>	At risk	Special concern	Schedule 1	Extirpated from Calgary	No
Mammal						
Badger	<i>Taxidea taxus</i>	Sensitive	Special concern	Schedule 1	Open vegetation communities with abundant prey	Possible
Little brown bat	<i>Myotis lucifugus</i>	May be at risk	Endangered	Schedule 1	Roost in tree cavities and under bark	No
Long-tailed weasel	<i>Mustela frenata</i>	May be at risk	Not at risk	No schedule	Open vegetation communities with abundant prey	Possible
Red bat	<i>Lasiurus borealis</i>	Sensitive	Not assessed	No schedule	Roost in foliage within forests	No
Silver-haired bat	<i>Lasionycteris noctivagans</i>	Sensitive	Not assessed	No schedule	Roost under tree bark but have been found in cavities	No
Western small-footed bat	<i>Myotis ciliobrum</i>	Sensitive	Not assessed	No schedule	Roosts in cliffs, rocky outcrops, and clay banks in valleys and badlands	No
Bird						
Bald eagle	<i>Haliaeetus leucocephalus</i>	Sensitive	Not at risk	No schedule	Nests in forested areas adjacent to large bodies of water	No

Common Name	Species Name	Alberta General Status ¹	COSEWIC ²	SARA ³	General Habitat	Presence of Habitat
Baltimore oriole	<i>Icterus galbula</i>	Sensitive	Not assessed	No schedule	Nests in riparian, woodland edges, and open areas with scattered trees	No
Bank swallow	<i>Riparia riparia</i>	Sensitive	Threatened	Schedule 1	Nests in vertical banks along waterbodies	No
Barn swallow	<i>Hirundo rustica</i>	Sensitive	Threatened	Schedule 1	Agricultural areas and open fields	Yes
Barred owl	<i>Strix varia</i>	Sensitive	Not assessed	No schedule	Swamps and riparian areas within forested areas	No
Black tern	<i>Chlidonias niger</i>	Sensitive	Not at risk	No schedule	Wetlands with emergent vegetation	No
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	Sensitive	Not assessed	No schedule	Variety of waterbodies	No
Black-necked stilt	<i>Himantopus mexicanus</i>	Sensitive	Not assessed	No schedule	Wetlands with emergent vegetation	No
Common yellowthroat	<i>Geothlypis trichas</i>	Sensitive	Not assessed	No schedule	Nests in thick vegetation in wetlands and riparian areas	No
Eastern kingbird	<i>Tyrannus tyrannus</i>	Sensitive	Not assessed	No schedule	Open environments and woodland edges	Yes
Great blue heron	<i>Ardea Herodias</i>	Sensitive	Special concern	Schedule 1	Nests in colonies near water. Forages in wetlands.	No
Horned grebe	<i>Podiceps auritus</i>	Sensitive	Special concern	Schedule 1	Small shallow wetlands with emergent vegetation	No
Least flycatcher	<i>Empidonax minimus</i>	Sensitive	Not assessed	No schedule	Semi-open, second growth, mid-successional forests and shrubby fields	No

Common Name	Species Name	Alberta General Status ¹	COSEWIC ²	SARA ³	General Habitat	Presence of Habitat
Osprey	<i>Pandion haliaetus</i>	Sensitive	Not assessed	No schedule	Nests on tall structures (trees, poles) within 10-20 km of abundant fish-bearing waterbodies	No
Pied-billed grebe	<i>Podilymbus podiceps</i>	Sensitive	Not assessed	No schedule	Wetlands with dense emergent or aquatic vegetation	No
Short-eared owl	<i>Asio flammeus</i>	May be at risk	Special concern	Schedule 1	Open communities with sufficient vegetative cover	Possible
Sora	<i>Porzana carolina</i>	Sensitive	N/A	N/A	Shallow wetlands dominated by emergent vegetation	No
Trumpeter swan	<i>Cygnus buccinator</i>	Sensitive	Not at risk	No schedule	Nests in a variety of waterbodies	No
Western grebe	<i>Aechmophorus occidentalis</i>	At risk	Special concern	Schedule 1	Waterbodies with extensive open water	No
Western wood-pewee	<i>Contopus sordisulus</i>	May be at risk	Not assessed	No schedule	Forests, edges and riparian areas	No
White-faces ibis	<i>Plegadis chihi</i>	Sensitive	Not assessed	No schedule	Wetlands with islands of emergent vegetation	No

Notes:

1. Provincial status according to 2015 AEP General Status Listing (Province of Alberta, 2017).
2. Federal status according to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Wildlife Species Search (Government of Canada, 2018e).
3. Legal status under the *Species at Risk Act* (SARA), according to the Species at Risk Public Registry (Government of Canada, 2018e).