Greenlight Electricity Centre Project Impact Assessment Agency of Canada Initial Project Description Summary

Prepared for:
Greenlight Electricity Centre Limited Partnership

July 2025

Prepared by:
Stantec Consulting Ltd.

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Acronyms / Abbreviations

%	percent
AACSW	Alberta Arts, Culture and Status of Women
AENV	Alberta Environment
AEPA	Alberta Ministry of Environment and Protected Areas (formerly Alberta Environment and Parks [AEP] and Alberta Environment (AENV)
AER	Alberta Energy Regulator
AHS	Alberta Health Services
Alliance Pipeline network	Alliance Pipeline natural gas distribution network
BOP	balance of plant
CCGT	combined cycle gas turbine
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CH_4	methane
DFO	Fisheries and Oceans Canada
DIZ Framework	Designated Industrial Zone regulatory framework document
ECCC	Environmental and Climate Change Canada
EPA	Environmental Protection Agency
ESC	erosion and sediment control
GECLP	Greenlight Electricity Centre Limited Partnership
GHG	greenhouse gas
GJ/day	gigajoules per day
GOA	Government of Alberta
GOC	Government of Canada
ha	hectare
HRA	*Historical Resources Act*
HRSG	heat recovery steam generator
HRV	historic resource value
IAAC	Impact Assessment Agency of Canada

IH-DIZ	Industrial Heartland – Designated Industrial Zone
IPD	Initial Project Description
km	kilometre
kV	kilovolt
m	metre
m^3/day	cubic metres per day
MW	megawatt
N_2O	nitrous oxides
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
PDA	Project Development Area
Pembina	Pembina Pipeline Corporation
PIP	Participant Involvement Plan
PM	particulate matter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
Q1	first quarter
Q2	second quarter
Q3	third quarter
Q4	fourth quarter
RNM	Regional Noise Model
RNMP	Regional Noise Management Plan
SARA	*Species at Risk Act*
SO_2	sulfur dioxide
the Project	Greenlight Electricity Centre Project
W4M	west of the fourth meridian

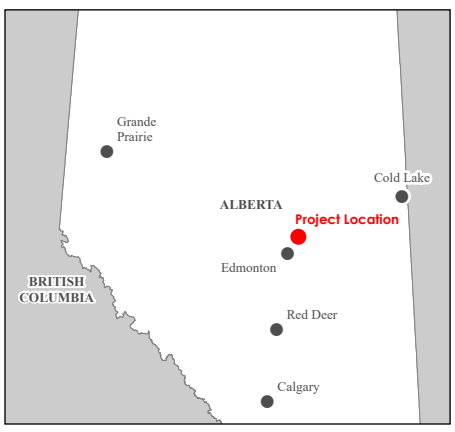
1 Introduction

Greenlight Electricity Centre Limited Partnership (GECLP) is pleased to submit this Initial Project Description Summary for the Greenlight Electricity Centre Project (the Project). This document summarizes the Initial Project Description (IPD) that has been prepared following the Impact Assessment Agency of Canada (IAAC) *Guide to Preparing an Initial Project Description and a Detailed Project Description* (IAAC 2024).

The Project is a combined cycle 1864 megawatt (MW) power generation facility that will be fueled by natural gas supplied from a pipeline tied to the existing Pembina Pipeline Corporation (Pembina) Alliance Pipeline natural gas distribution network (Alliance Pipeline network). Electricity produced by the Project will be fed into the Alberta Provincial Grid to meet the electric power requirements of the province and to supply data centres.

The Project is in the Alberta Industrial Heartland – Designated Industrial Zone (IH-DIZ) located on approximately 98 hectares (ha) of private land. The location of the Project is provided in Figure 1.1 and a conceptual layout showing the location of the Project components is presented on Figure 1.2.

TOWNSHIP RD 564 - PADSTOW RD
RANGE RD 224
TWP-056
RGE-22
MER-4
RANGE RD 221
643
RANGE RD 223
RANGE RD 222
Sturgeon
County
TOWNSHIP RD 561
825
TOWNSHIP RD 560
TWP-055
RGE-22
MER-4
Sturgeon
River
TOWNSHIP RD 555
North Saskatchewan River



Power Generation Facility
Project Development Area
Temporary Workspace and Laydown
Road
Watercourse
Waterbody

0 1 2
kilometres

(At original document size of 11x17) 1:30,000

N

Stantec

Notes
1. Coordinate System: NAD 1983 3TM 114
2. Data Sources: Base - Governments of Canada and Alberta; Thematic - Kineticor
3. Imagery: Strathcona County, Maxar

Project Location
NE ¼ and SE ¼ 10-056-22 W4M, Alberta

Prepared by WH on 2025-06-13

Client/Project
123514064-0001
Greenlight Electricity Centre Limited Partnership
Greenlight Electricity Centre Project
Initial Project Description

Figure No.
1.1

Title
Project Overview

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SW-15-056-22W4

SE-15-056-22W4

SW-14-056-22W4

643

NW-10-056-22W4

NE-10-056-22W4

NW-11-056-22W4

Sturgeon County

SW-10-056-22W4

SE-10-056-22W4

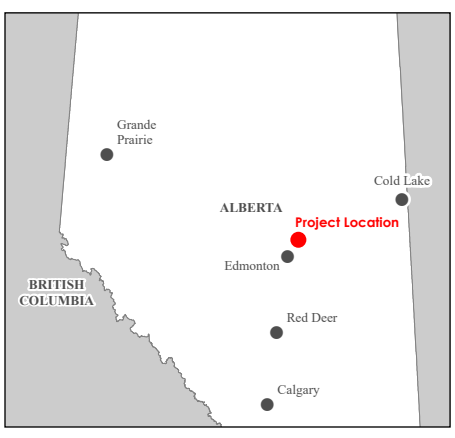
RANGE RD 222

SW-11-056-22W4

NW-03-056-22W4

NE-03-056-22W4

NW-02-056-22W4



Notes

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2. Data Sources: Base - Governments of Canada and Alberta; Thematic - Kineticor

3. Imagery: Strathcona County, Maxar

Layout Component

- Admin Building
- Air Cooled Condenser (ACC)
- Ammonia Storage and Unloading
- Gas Metering/Regulating
- Gas Turbine/Steam turbine Generator Building
- HRSG Stack
- Heat Recovery Steam Generator
- Hydrogen/CO2 Storage
- Future Carbon Mitigation Process Site
- Service/Fire Water Storage Tank
- Stormwater Pond
- Switch Yard
- Water Treatment Building
- Project Development Area
- Temporary Workspace and Laydown
- Road
- Quarter Section

0 100 200

metres

(At original document size of 11x17) 1:6,500

N

Stantec

Project Location
NE ¼ and SE ¼ 10-056-22 W4M, Alberta

Prepared by WH on 2025-06-13

Client/Project
123514064-0002

Greenlight Electricity Limited Partnership
Greenlight Electricity Centre Project
Initial Project Description

Figure No.
1.2

Title

Conceptual Project Layout

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2 General Information

Name of Project:	**Greenlight Electricity Centre Project**
Name of Proponent:	Greenlight Electricity Centre Limited Partnership
Address of Proponent:	1410, 715 – 5 Avenue SW Calgary, AB T2P 2X6
Website	https://kineticor.ca/operation/greenlight-electricity-centre/
Principal Contact Person:	Rob Thomas Director, Regulatory Services Greenlight Electricity Centre Limited Partnership T: +1 (403) 460-2489 x206 M: +1 (403) 815-0203 rob.thomas@kineticor.ca
Environmental Contact Person:	Jason Doupe Vice President Stantec Consulting Ltd. M: +1 (403) 585-0842 jason.doupe@stantec.com

3 Summary of Government Agency Engagement

GECLP initiated engagement with federal, provincial, and municipal agencies in June 2023 and will continue to engage agencies and stakeholders through development of the Project. Agencies consulted to date include:

- Impact Assessment Agency of Canada
- Alberta Arts, Culture, and Status of Women (AACSW)
- Alberta Electric System Operator
- Alberta Environment and Protected Areas
- Alberta Utilities Commission
- Aboriginal Consultation Office
- Alberta Transportation and Economic Corridors
- Sturgeon County

Initial engagement with government agencies to date has focused on introducing the Project and understanding applicable regulatory approvals and processes for the Project.

4 Summary of Indigenous and Public Engagement

4.1 Engagement with Indigenous Groups

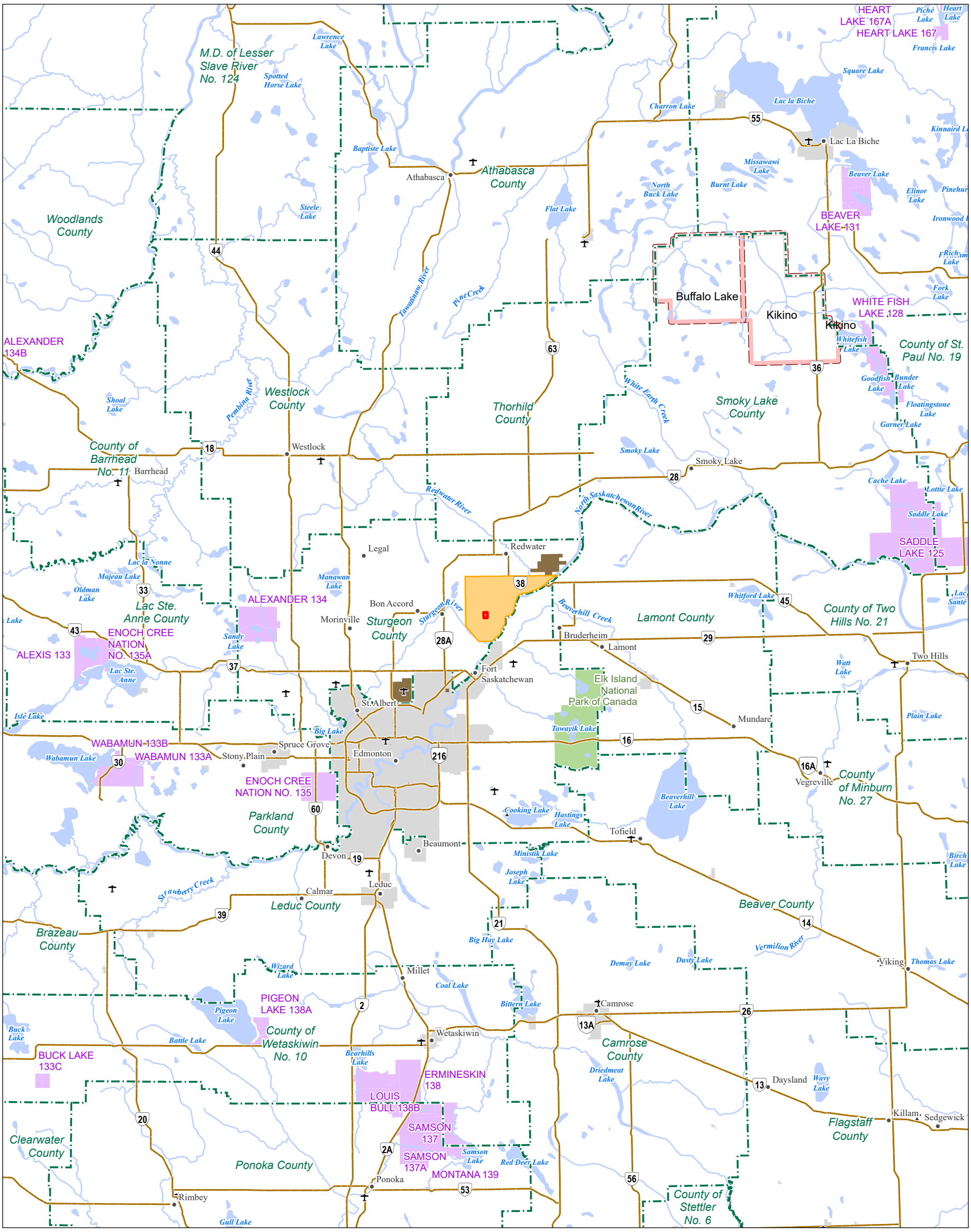
GECLP acknowledges and respects the rights of Indigenous people and is committed to an engagement process that incorporates input from Indigenous groups to facilitate information sharing, two-way dialogue to understand perceived Project impacts, incorporate mitigation measures, consider Indigenous knowledge, and advance reconciliation.

Ten Indigenous groups were initially identified for engagement on the Project based on the Government of Alberta's online Landscape Analysis Indigenous Relations Tool (Figure 4.1):

- Paul First Nation
- Enoch Cree Nation
- Beaver Lake Cree Nation
- Kehewin Cree Nation
- Alexander First Nation
- Saddle Lake Cree Nation
- Whitefish/Goodfish Lake First Nation
- Buffalo Lake Métis Settlement
- Kikino Métis Settlement
- Lac Ste. Anne Métis Community Association

IAAC identified an additional eight Indigenous groups for engagement:

- Ermineskin Cree Nation
- Louis Bull Tribe
- Montana Cree Nation
- Samson Cree Nation
- Foothills Ojibway First Nation
- Kelly Lake First Nation
- Métis Nation of Alberta
- Métis Nation of Alberta, Region 4



Notes

1. Coordinate System: NAD 1983 3TM 114

2. Data Sources: Base - Governments of Canada and Alberta; Thematic - Kineticor

Stantec

Project Location
NE ¼ and SE ¼ 10-056-22 W4M, Alberta

Prepared by WH on 2025-06-13

Client/Project
123514064-0003

Greenlight Electricity Centre Limited Partnership
Greenlight Electricity Centre Project
Initial Project Description

Figure No.
4.1

Title

Location of Indigenous Groups and Nearby Federal Lands

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Introductory letters were sent to the 18 Indigenous groups in May 2025. The letter introduced GECLP, provided a high-level description of the Project, and invited groups to meet with the Project team including a field visit to the proposed site. GECLP hosted a Project Open House on July 26, 2023. No representatives from any Indigenous groups attended the July 2023 Open House. All 18 Indigenous groups were also invited to a second open house held on June 26, 2025. No groups came to the open house, and there were no concerns raised. As of July 2025, GCELP has not received feedback about the Project from any Indigenous groups.

GECLP is committed to engaging with all potentially affected Indigenous groups throughout the life of the Project. Proposed engagement and notification delivery methods for future engagement will include:

- in-person meetings with Indigenous group's primary engagement contact
- in-person meetings with Indigenous group's Chief and Council
- in-person meetings with Indigenous group trappers
- community meetings and meals
- Project notifications and ongoing updates of Project information
- information packages and maps sent by mail
- email and telephone conversations
- Project website: https://kineticor.ca/operation/greenlight-electricity-centre/, toll-free line and project-specific email address
- participation in community events to promote informal dialogue regarding the Project

Should additional Indigenous groups not previously identified for engagement express interest in the Project, GECLP is committed to engaging with those interested communities through the following methods:

- Provide relevant, up to date Project information
- Identify potential concerns related to Indigenous community rights and traditional uses within the Project Development Area (PDA) and work with each community to develop effective mitigation for potential impacts
- Ongoing Project notifications and Project updates
- Project information packages and maps sent by registered mail
- Ongoing communications (telephone, email correspondences)

GECLP has developed a Participant Involvement Plan (PIP) to enable GECLP to build long-term relationships with Indigenous groups in close proximity to the Project PDA, enhance the understanding of Indigenous culture and rights, and provide Indigenous groups with clear and timely Project information.

Feedback received during engagement will be used to influence Project design and help GECLP build long-term mutually beneficial relationships with Indigenous groups.

4.2 Engagement with Public and Other Stakeholders

The Project is located in Sturgeon County and is in close proximity to Strathcona County and Lamont County. Land ownership within the vicinity of the Project is identified as both private and public land. The Project will be located on private land. Potentially affected and interested stakeholder groups for the Project include:

- occupants, landowners, and residents
- elected federal and provincial representatives for Sturgeon County
- provincial agencies (e.g., Alberta Environment and Protected Areas; Alberta Aboriginal Consultation Office; AACSW; Alberta Utilities Commission, Alberta Transportation and Economic Corridors, Alberta Energy Regulator, and Alberta Electric System Operator)
- Alberta's Industrial Heartland Association
- trappers, caveats, disposition holders
- special interest/advocacy groups
- area recreational users or interests
- regional associations, community groups and local businesses

Initial public engagement activities in July 2023 involved sending introductory packages to landowners located within 3 kilometres (km) of the Project. The package introduced GECLP, provided a high-level description of the Project, and invited groups to meet with the Project team. GECLP received no responses from contacted landowners. GECLP also hosted two Project Open Houses. The first Project Open House on July 26, 2023 to which approximately 12 stakeholders attended. A second Project Open House was held on June 26, 2025. There were no key issues or concerns raised.

The key concern expressed to date by stakeholders is related to proximity to existing land use. GECLP explained that the location is within the IH-DIZ purposefully to reduce land use concerns. No additional follow-up except Project updates as available were requested.

Engagement will continue to take place among local and regional government officials and representatives, industry and local business, immediately adjacent landowners, area recreational users, and the public so that potential Project specific issues or concerns may be raised, properly addressed and, if possible, resolved.

The PIP provides opportunities for stakeholders to voice their concerns or issues. GECLP will also organize and facilitate one-on-one meetings with stakeholders if requested. GECLP will strive to work together with the communities to share information and build mutually beneficial relationships.

5 Regional Assessments and Relevant Studies

There are no known regional assessments of the area in which the Project is located that were conducted under Sections 92 or 93 of the *Impact Assessment Act.*

The Government of Alberta (GOA) developed a regulatory framework document (DIZ Framework), which designated the IH-DIZ as the first DIZ in Alberta (Alberta Environment and Parks 2022). The DIZ Framework outlines key principles and operational policies for managing a designated industrial zone and provides guidance to partners and statutory decision-makers on processes and protocols. The IH-DIZ is municipally zoned for heavy industrial use, and the management processes and operational policies outlined in the DIZ Framework are designed to align with this long-term management intent.

Historical environmental studies in the IH-DIZ have been undertaken over the course of several provincial environmental impact assessments including the Shell Canada Limited Quest Carbon Capture and Storage Project (Stantec 2010) which is located approximately 5 km from the Project.

To support ongoing development in the IH-DIZ, the GOA has commissioned several environmental studies including:

- a Regional Water Feasibility Study to provide guidance on long term planning and opportunity for handling water within the IH-DIZ (Stantec 2022)
- a photochemical modelling exercise (Ramboll 2022) and pollution control jurisdictional scan (Stantec 2021) that assisted in the development of emission limits for existing and approved emission sources (Environmental Protection Agency [EPA] 2022)

In addition to these regional studies, routine valued component specific monitoring takes place in the IH-DIZ. Results are published by monitoring agencies such as the Heartland Air Monitoring Partnership and the North Saskatchewan Watershed Alliance. Other monitoring is done as part of provincial and federal monitoring networks such as Water Survey Canada.

6 Strategic Assessments

No strategic assessments as referenced in subsection 95(2) of the *Impact Assessment Act* have been carried out that are relevant to the Project. However, *the Strategic Assessment of Climate Change* (Government of Canada [GOC] 2020) applies to designated projects under the *Impact Assessment Act*. conducted under could be applicable to the Project and is relevant to the assessment of greenhouse gas (GHG) emissions and potential effects on climate change.

7 Project Purpose, Need, and Benefits

The purpose of the Project is to supply reliable, affordable, and dispatchable (on-demand) low-emitting generation to Albertans. Coal has been retired, and older less efficient gas-fired generation is being retired as the decarbonization of Alberta's electricity supply progresses. The Project will provide low-emitting electricity to support both existing economic activity in Alberta as well as support the growing demand for power by both industry and data centres in the IH-DIZ.

The Project's ability to produce electricity on-demand, regardless of weather or other conditions and baseload operation, will positively contribute towards Albertans receiving safe and reliable electricity for cooling and heating during extreme events at times when output from renewable electricity sources in Alberta has historically been limited or non-existent.

In Alberta's competitive wholesale electricity market structure, the need for new electricity generation sources is established by a combination of regulatory and market (commercial) forces. The Province of Alberta is actively seeking $100 billion of investment in artificial intelligence technology to drive innovation, create jobs, and diversify its economy. This will create additional power requirements within the province. The Project can support the growing data centre industry in Alberta. Strategically located near a skilled workforce and established infrastructure, the Project site and surrounding area provides sufficient land to accommodate future data centre energy requirements.

With respect to the need to site the Project in the IH-DIZ, this area of Alberta offers a unique coincidence of infrastructure capacity, project execution support capabilities to host the Project, and existing and planned industrial users with need. The IH-DIZ is a major hub for industrial development such as oil and gas and chemical manufacturing facilities. Natural gas combined cycle power generation facilities are a high efficiency, environmentally attractive form of power generation necessary to meet the growing demand for electricity in Alberta.

In addition to providing a high efficiency, environmentally attractive form of power generation necessary to meet the growing demand for electricity in Alberta, the Project will generate economic benefits. The Project is anticipated to employ approximately 1,500 workers at the peak of construction, with an expected work effort of almost 4,500,000 worker-hours in the local area. The total capital investment is approximately $4-6 billion, with more than 40 direct, long-term skilled jobs created once operations commence. The Project will provide well-paying jobs that will benefit the local and Indigenous communities, use local businesses and suppliers, and provide additional tax revenue to Sturgeon County.

8 Physical Activities Regulation

The Physical Activities Regulations list the activities and types of projects (designated projects) potentially requiring an impact assessment. Section 30 of the Regulations states:

> *The construction, operation, decommissioning, and abandonment of a new fossil fuel-fired power generating facility with a production capacity of 200 MW or more.*

The Project meets the requirements to be a designated physical activity, potentially subject to assessment under the *Impact Assessment Act*.

9 Project Information

The Project is an 1864 MW power generation facility located on approximately 98 ha of privately owned land within an area currently zoned for industrial use in Sturgeon County. Approximately 65 ha of land is allocated for Project infrastructure and 32 ha are available for storage and temporary workspace. Electricity produced by the Project will be fed into the Alberta Provincial Grid to meet the electric power requirements of the province and supply data centres. Pending regulatory approvals, Project construction is scheduled to begin in 2026 with a planned in-service date of first quarter (Q1) 2031. The operational life of the Project is expected to be approximately 40 years. Additional information on physical works and activities is provided below.

9.1 Project Infrastructure

The Project is a combined cycle power generation facility that will feature four 1x1 gas/steam turbine line ups. Each line up will produce approximately 466 MW for a total plant output of 1864 MW. Combined cycle gas turbines (CCGTs) combust natural gas to produce power in a gas turbine which can be converted to electrical power by a coupled generator. The hot exhaust gases from the gas turbine are used to produce steam in a heat recovery steam generator (HRSG). This steam is supplied to the steam turbine to produce additional power. Other sub components of the CCGT include an air-cooled condenser, natural gas compressor, two generator step-up transformers, and auxiliary systems. The CCGT also includes interconnecting water, steam, compressed air, and natural gas supply lines to facilitate the operations of process equipment.

In addition to the power generating components, the balance of plant (BOP) will consist of fuel gas treatment components, generator step-up transformers, associated power distribution modules, and the demineralized water treatment facility with associated storage tanks.

The Project will include several buildings or enclosures of varying sizes, including a power island building (i.e., Generation Building) which will enclose the gas/steam turbines, generator, and other BOP electrical and mechanical equipment, and a multi-purpose building to house operating and maintenance staff. A parking lot will be located on the west side of the multi-purpose building. An all-weather site access road will be constructed to run from Highway 643 to the north boundary of the plant fenced area. A stormwater pond will be designed to collect surface water runoff from the site. Figure 1.2 presents a conceptual Project layout.

9.2 Ancillary Infrastructure

The Project will require ancillary infrastructure that will be constructed and permitted by third-party developers as listed below:

- A 240 kilovolt (kV) transmission line (approximately 4 km long) will connect the Project to the existing 240 kV transmission line 942L; the transmission line will be developed and permitted by Altalink and regulated by the Alberta Utilities Commission
- A pipeline (approximately 12 to 16 inches in diameter and 7 to 10 km long) will deliver natural gas from the Alliance Pipeline network; the pipeline which will be developed and permitted by Pembina Pipeline Corporation and regulated by the Alberta Energy Regulator
- A water connection to the existing Sturgeon County municipal water supply will deliver the required source water for the Project (estimated at 1250 cubic metres per day [m^3/day] subject to final design)
- Ancillary roads and utilities
- Telecommunications (i.e., fibre optic network) provided by AltaLink

At a net output of 1864 MW, the Project will require approximately 292,272 gigajoules or 273 million cubic feet of natural gas per day and approximately 1250 cubic metres of water per day. The provision of water, power, fuel, and telecommunications, and highway access to the Project site are not under GECLP's care and control and are considered outside the scope of the Project.

9.3 Project Activities

9.3.1 Construction

Construction activities are estimated to occur over a three-year period and will include clearing vegetation, access road construction, surface preparations, installation of major equipment, connection of process and ancillary equipment, site drainage and erosion control, and site clean-up and restoration.

Site preparation is expected to take approximately four to five months to complete and includes clearing vegetation, topsoil stripping, stockpiling, and levelling the PDA to a predetermined site grade. The balance of site preparation includes installing the site fence, preparing the switchyard area, constructing the stormwater pond, and constructing the access roads on the site. This will be followed by foundation excavation and construction which includes excavation, piling construction, and foundation/substructures construction. Building construction includes mechanical, electrical, and switchyard construction.

Commissioning activities include start-up planning and preparation, the start-up and commissioning process, start-up and commissioning management, operator training management, and performance testing.

Cleanup activities will be ongoing throughout construction. Following construction, waste materials will be removed and areas not covered by asphalt, gravel, or structures will be revegetated to an equivalent land capability as defined by the Conservation and Reclamation Regulation.

9.3.2 Operation and Maintenance

GECLP will serve as the Project owner and engage a contractor for Project operation and maintenance. Day to day operation and maintenance will be provided by a staff of operators, engineers, and support staff totaling approximately 40 people. The turbine and generator manufacturer will provide major maintenance and inspection work for the turbines and generators.

The Project will require up to 297,272 gigajoules per day (GJ/day) of natural gas, with an estimated net plant efficiency between 55 and 65 percent (%). The waste heat from the gas turbine exhaust will be used in HRSG to produce steam that will ultimately power the steam turbine. Electricity generated by the gas turbines generator will be stepped up to 240 kV using the generator step-up transformers before interconnecting to the AltaLink transmission system.

The HRSG is a waste heat boiler which produces high pressure, intermediate pressure, and low-pressure steam. Amine, phosphate, and ammonia are injected into the steam cycle along with continuous and intermittent boiler blowdown to maintain desired cycle chemistry to minimize corrosion and prevent scale formation.

The HRSG boiler blowdown system collects continuous and intermittent blowdown from the HRSG. Drains are routed from the collection points to the boiler blowdown tank where the steam expands and cools and is recycled back to the service water tank for reuse, reducing the overall water consumption of the facility. The boiler blowdown drain, HRSG stack drain, and feedwater pressure relief valves are routed to the plant drains system and pumped back to the Service/Fire Water Tank for reuse.

Make-up water, primarily required for the HRSG and equipment cooling, will be supplied from the existing municipal water supply. The source water will be processed in a demineralized water facility to bring it to acceptable specification for use. Demineralized water will be stored in the demineralized water tank which will hold approximately two days worth of demineralized water to improve operational reliability. The water will be recycled to the extent possible in the operation of the Project and contained in a closed loop system. Spent process water may be disposed through injection into a deep disposal well or transported offsite for disposal in accordance with application regulations and standards.

A continuous emissions monitoring system will be installed at the facility to measure and report emissions data per the requirements of the New Source Emission Guidelines for Thermal Generation (Environment and Climate Change Canada [ECCC] 2023) and for use in controlling the unit.

9.3.3 Decommissioning and Abandonment

The Project is expected to operate for approximately 40 years. Precise timing for the decommissioning of the facility cannot be predicted at this time as it depends solely on the mode of operation. However, relevant environmental regulations in existence at the time of decommissioning will be adhered to. A Decommissioning and Reclamation Plan will be developed for the Project at that time.

10 Estimated Maximum Project Capacity

The Project is a combined cycle power generation facility that will feature four 1x1 gas/steam turbine line ups. Each line up will produce approximately 466 MW, for a maximum project capacity of 1864 MW.

11 Project Schedule

The anticipated Project schedule is presented in Table 11.1.

Table 11.1 Project Schedule

Date	Project Phase
Q2-Q3 2025	Field surveys and technical studies
Q3 2025 – Q1 2026	Permits and approval applications
Q2 2025 – Q2 2027	Detailed engineering and procurement
2026 – 2030	Construction
Q3 2029	Start up / commissioning
Q1 2031	In service
2070-2072	Project decommissioning (after estimated 40-year life)

Notes:
Q1 – first quarter
Q2 – second quarter
Q3 – third quarter
Q4 – fourth quarter

If IAAC determines that a federal impact assessment is required, the schedule would be extended by approximately two to three years, with an estimate in service date in 2033/2034.

12 Project Alternatives

Currently there are no technically and economically feasible alternatives to the Project that generate up to 1864 MW of net baseload electricity.

Alternative means of carrying out the Project included options with respect to:

- facility siting
- gas-fired combined cycle power generation technology (e.g., configuration and sizing)
- cooling technology (e.g., water or air cooling)

GECLP evaluated several potential locations to develop the Project, but based on its initial screening analysis, concluded that the selected area for the Project was optimal considering environmental site conditions and proximity to electric and gas interconnections.

For dispatchable baseload natural gas-fired power generation, CCGT configurations such as those selected for the Project, offer the best available technical and economic solutions. CCGT consists of both a combustion gas turbine generator and a steam turbine generator, where the steam for the steam turbine generator is raised from the heat contained in the combustion gas turbine generator exhaust gases.

Various process steps and equipment in the power generation facility require cooling, which is provided by heat exchange with either air or cooling water. In air cooling, ambient air is blown through heat exchangers, and heat is transferred from the process to the air. In water-based cooling, water is circulated through heat exchangers, and heat is transferred to the water as a result. Air cooling offers significant environmental advantages relative to water-based cooling as there is no need for large-scale source of make-up water and associated infrastructure to compensate for water evaporated or otherwise removed from a cooling water circuit.

13 Geographic Information

The Project is located on approximately 98 ha of privately-owned land that is currently leased out for agricultural purposes. The Project is situated in the Alberta IH-DIZ in Sturgeon County, approximately 10 km east of Gibbons, Alberta (Figure 1.1). The Project is located at NE-10-056-22-W4M and SE-10-056-22-W4M. The centre of the Project is at approximately Latitude 53° 49’ 44.76” N (53.8291) Longitude 113°10’50.52” W (-113.1807). A PDA which includes the physical footprint of Project disturbance (including area for temporary workspace and storage but excluding third-party ancillary infrastructure) has been defined as the northeast quarter (NE-10-056-22-W4M) and part of the southeast quarter (SE-10-056-22-W4M) of Section 10 Township 56 Range 22 W4M.

Natural gas will be provided by a pipeline from the Alliance Pipeline network approximately 7.5 km south of the Project. The pipeline route is still in development but is anticipated to be between 7.5 and 10 km in length. The Project will be connected to the Alberta Interconnected Electric System by an AltaLink transmission interconnection, approximately 4 km in length, that will connect to the existing 240 kV transmission line via a T-tap connection.

There are three known residential dwellings within 2 km of the PDA. The nearest known residential dwelling is located approximately 1 km northwest of the Project. The City of Fort Saskatchewan is approximately 5 km southeast of the PDA and the Town of Gibbons is located approximately 8.5 km to the west of the PDA. The nearest park is the Northwest of Bruderheim Natural Area which is located 8 km to the northwest of the Project. The Warren Thomas Aerodrome in Josephburg is located approximately 12 km southeast of the Project.

The Project does not overlap any federally owned lands (Figure 4.1). The nearest federally owned lands to the Project include the Redwater Department of Defense Military Base (approximately 15 km northeast), Elk Island National Park (approximately 22 km to the southeast), and the 3rd Canadian Division Support Base Edmonton (commonly referred to as Edmonton Garrison, approximately 24 km west of the Project).

The Project is located in Treaty 6 territory and is proximal to Indigenous groups and organizations, as shown in Figure 4.1. There are 18 First Nation Reserves and/or Metis settlements within 150 km of the Project. The nearest Indigenous lands to the Project are associated with the Alexander 134 reserve (45 km) and Enoch Cree Nation No. 135 reserve (47 km).

14 Physical and Biological Environment

The Project is located within the southern Dry Mixedwood Natural Subregion of the Boreal Natural Region of Alberta (Natural Regions Committee 2006) on agricultural land with some remnant patches of deciduous forest land and numerous small wetlands. This subregion has warmer summers and milder winters than other subregions in the Boreal Natural Region. The majority of annual precipitation falls during the growing season, with peak precipitation in June and July (Natural Regions Committee 2006). Land-use in the region includes forestry, oil and gas activity, grazing, and cultivation (Natural Regions Committee 2006).

14.1 Atmospheric Setting

The Project is located approximately 14 km northeast of Edmonton, Alberta in the IH-DIZ, with multiple industrial facilities in the area.

The Project is located within the Heartland Air Monitoring Partnership, a multi-stakeholder, not-for-profit organization responsible for collecting and sharing air quality monitoring data information on ambient air quality. From 2022 to 2024, air quality indicators (e.g., nitrogen dioxide [NO_2], sulfur dioxide [SO_2], particulate matter 2.5 microns or less in diameter [$PM_{2.5}$] and carbon monoxide [CO]) fell mostly in the low-risk category. Occasional high-risk readings were primarily due to periods of increased wildfire smoke. To assess existing air quality conditions, data from nearby monitoring stations were analyzed following provincial guidelines. The analysis showed that baseline levels of key air pollutants were well below Alberta's air quality standards, indicating that the area typically experiences clean air with limited pollution-related concerns.

14.2 Acoustic Setting

Environmental noise effects of the regulated facilities within the IH-DIZ need to comply with the Alberta Energy Regulatory (AER) Directive 038: Noise Control (AER 2024), and Alberta Utilities Commission Rule 012 (AUC 2024) with consideration of the Northeast Capital Industrial Association's Regional Noise Management Plan (RNMP). The RNMP provides a regional approach for managing environmental noise from industrial activities and is the regional solution for Northeast Capital Industrial Association member companies. The Regional Noise Model (RNM), developed following the RNMP, is an online tool showing the baseline noise contours in the IH-DIZ region. Once the Project obtains access to the RNM, noise contour data from the existing energy-related facilities will be accessed.

14.3 Hydrogeologic and Geologic Setting

The PDA generally consists of unconsolidated sediments of clay, till, and/or sand underlain by the Wapati and Belly River Formations consisting of sandstone, siltstone, and mudstone. The unconsolidated sediments (clay, sandy clay, till, and/or sand) thickness in the vicinity of the Project area generally ranges from approximately 1.5 – 9.1 metres (m); however, certain areas reported clay, clay and rocks, sand, and/or sand and rocks to a maximum depth of 48.8 m (Alberta Ministry of Environment and Protected Areas [AEPA] 2025).

The groundwater yield capacity at the Project site is mapped at approximately 7-33 m^3/day (Stein 1976) and is assumed to be within interbedded shale and sandstone units. Groundwater flow patterns in the area around the Project are expected to be topographically driven from regional topographic highs to regional hydrological drainage features including the North Saskatchewan, Sturgeon, and Redwater Rivers. Groundwater levels in the area of the Project, where reported, ranged from 2.4 m to 33.5 m below grade (AEPA 2025). Groundwater is predominately found in the sandstone bedrock; however, localized perched aquifers in the unconsolidated deposits is likely to be present.

14.4 Surface Water, Fish and Fish Habitat

The Project is within the North Saskatchewan Above Beaverhill sub-watershed of the North Saskatchewan River watershed. The North Saskatchewan River is located approximately 4 km west and the Sturgeon River is located approximately 4.4 km southwest at their closest points. There are seven unnamed tributaries to the North Saskatchewan River located within 5 km of the Project and three unnamed tributaries to the Sturgeon River are located within 5 km of the Project. Desktop assessments did not show evidence of watercourses or tributaries occurring within the PDA.

Several fish species of management concern have been observed in watercourses within a 10 km radius of the Project including lake sturgeon (*Acipenser fulvescens*) (EPA 2025) which is listed as threatened under the provincial *Wildlife Act*. Federally, there is no mapped critical habitat for aquatic species at risk in the North Saskatchewan River or the Sturgeon River in the reaches described above, nor any of their tributaries within 5 km of the Project (Fisheries and Oceans Canada [DFO] 2025). Further environmental field assessments will occur in 2025 to field verify desktop findings.

14.5 Soils

The Project is located on previously cultivated fields with rolling shallow slopes. The predominant soil types in the PDA and surrounding area are Hobbema and Ponoka soil series. These soils are characterized as well drained, with low wind and water erosion risks, and good to fair reclamation suitability (GOA 2025; Pedocan 1993). A soil survey and clubroot testing will occur in 2025.

14.6 Vegetation and Wetlands

The Project is located in the Dry Mixedwood Natural Subregion of the Boreal Natural Region of Alberta (Natural Regions Committee 2006). The PDA is primarily cultivated with some surrounding trees, modified grassland, tame pasture, and an abandoned farmyard and is surrounded by cultivation, and industrial areas.

Vegetation and wetland surveys conducted in the PDA in 2023 revealed no species of management concern but did identify several noxious weeds. Several wetlands have been delineated in the PDA including ephemeral waterbodies, temporary graminoid marshes, seasonal graminoid marshes and a semi-permanent graminoid marsh. Many of the wetlands were cultivated through and contained agronomic and non-native species, but some contained native vegetation species including broadleaf cattail (*Typha latifolia*), tufted hairgrass (*Deschampsia cespitosa*), water knotweed (*Persicaria amphibia*), water sedge (*Carex aquatilis*). field horsetail (*Equisetum arvense*), and reed canary grass (*Phalaris arundinacea*).

14.7 Wildlife

The PDA is mainly cultivated but contains several wetlands and patches of treed areas and modified grassland that may provide suitable habitat for wildlife. The landscape surrounding the PDA is predominantly agricultural and industrial.

The Project overlaps the ranges of 19 wildlife species at risk (i.e., species listed as endangered, threatened, or special concern on Schedule 1 of the *Species at Risk Act* [SARA]), including 12 birds, two amphibians, three mammals, and two arthropods. The Project does not overlap the range of any aquatic species at risk. Further, there is no identified critical habitat for species at risk within the PDA.

Based on habitat availability, it is unlikely that most species at risk with ranges overlapping the PDA would occur within the Project footprint. However, there is some potential for common nighthawk (*Chordeiles minor*), American badger (*Taxidea taxus taxus*), western tiger salamander (*Ambystoma mavortium*), and western toad (*Anaxyrus boreas*) to occur in vicinity of the Project. No species at risk were identified during 2023 Project surveys.

Further wildlife field studies, including a nocturnal amphibian survey, breeding migratory bird survey, raptor nest survey and waterbird usage survey are planned for 2025.

15 Socio-economic Environment

The City of Edmonton is an urban municipality located near the geographic centre of Alberta. Sturgeon County is a rural municipal district in the Edmonton Metropolitan Region of Alberta, located approximately 40 km northwest of Edmonton. Several localities and hamlets are located within the County, including the Town of Gibbons. The City of Fort Saskatchewan is located approximately 35 km northeast of Edmonton. The municipalities that are closest to the Project geographically are Fort Saskatchewan (6.8 km southeast) and Gibbons (8.5 km west).

Between 2016 and 2021, the population of Edmonton increased 8.3% from 933,088 to 1,010,899 while the population of Sturgeon County decreased 2.1% from 20,495 in 2016 to 20,061 in 2021. Fort Saskatchewan's population increased 12.1% from 24,169 to 27,088 between 2016 and 2021 and the population of Gibbons increased 1.8% from 3,159 to 3,218 (Statistics Canada 2023). In 2021, 5.8% of Edmonton's population identified as Indigenous while 8.4% Sturgeon County's population identified as Indigenous (Statistics Canada 2023). Notably, the Indigenous population of Fort Saskatchewan increased nearly 35% between 2016 and 2021. In 2021, women+ (includes women and/or girls, as well as some non-binary persons) comprised 50.7% of the study area population (Statistics Canada 2023).

The unemployment rates in Edmonton and Sturgeon County in 2021 were slightly higher (12.7%) and lower (8.3%), respectively, than that of the province (11.5%) (Statistics Canada 2023). The labour force participation rates of all communities were similar to that of the province (68.0%) in 2021. The rate of participation in the labour force was highest in Fort Saskatchewan at 70.9%.

Edmonton, Sturgeon County, Gibbons, and Fort Saskatchewan are in Alberta Health Service's Edmonton Zone. The Edmonton Zone offers many health care facilities, health programs, and services. Edmonton has more than 20 hospitals and health centres, the largest of which is the Royal Alexandra Hospital. Fort Saskatchewan and Gibbons each have a health care centre and Fort Saskatchewan has a community hospital (Alberta Health Services [AHS] 2016). With respect to general health indicators, residents of the province and the Edmonton Zone reported similar levels of perceived health in 2020, with just over 63% of residents in the Edmonton Zone stating that they perceive their health to be very good or excellent and over 82% having a regular healthcare provider (Statistics Canada 2022).

With respect to historic resources, a review of the listing of Historic Resources (AACSW 2025) revealed a Historic Resource Value (HRV) (HRV 5a) for the southeast corner of the PDA indicating there is perceived high archaeological site potential. One archaeological site (FkPh-50, a historic period artifact scatter), was recorded within the PDA; however, it has an HRV of 0 (meaning little to no remaining perceived archaeological value) (AACSW 2023a; Alberta Geospatial Portal 2025; Leyden 2007). The lands have been cultivated, which typically reduces the potential for intact historical resource sites to be present within the plow zone. Archaeological sites in the surrounding sections are small (isolated artifact finds or small artifact scatters) and are from disturbed contexts due to cultivation; none are considered to have remaining archaeological value (Leyden 2007).

There may be remains of a former homestead or farmyard in the southeast corner of the footprint which were previously recorded in 2006 under archaeological permit 06-184. Two buildings (HS99929 and HS99930) have been recorded within the Alberta Register of Historic Places (Alberta Heritage Survey Program 2025; Leyden 2007). Based on review of air photos, the buildings were removed by 2010. The overall potential for recovery of intact historical resources (archaeological and palaeontological) is considered to be low primarily due to the highly disturbed nature of the lands as a result of farming activities.

16 Financial Support from Federal Authorities

Financial support for the Project is not required from federal authorities. Applications for federal grants or funding opportunities may be explored, as available.

17 Use of Federal Lands for Project

The Project will not be constructed or operated on federal lands.

18 Regulatory Requirements, Duties, and Power

In addition to the current process under the *Impact Assessment Act*, the Project will be subject to compliance with the following federal legislation:

- *Fisheries Act*
- *Migratory Birds Convention Act*
- *Species at Risk Act*

Authorizations or approvals are not anticipated to be required for the Project under these Acts.

The Project and/or ancillary infrastructure (e.g., pipeline, transmission) is expected to require approvals associated with the following provincial legislation:

- *Hydro and Electric Energy Act*
- *Electric Utilities Act*
- *Environmental Protection and Enhancement Act*
- *Water Act*
- *Historical Resources Act*
- *Pipeline Act*

Although the Project will require an approval issued under the *Environmental Protection and Enhancement Act,* since it is not listed in the Environmental Assessment (Mandatory and Exempted Activities) Regulation, an environmental impact assessment is not mandatory.

In addition to federal and provincial regulatory requirements, the following municipal regulatory requirements apply to the Project:

- Sturgeon County Municipal Development Plan Bylaw #1313/13 (Sturgeon County 2014) which is intended to provide a long-range planning vision for the future growth of the municipality, focusing on land use, but also guiding social, cultural, environmental, economic and infrastructure factors
- Sturgeon County Land Use Bylaw 1385/17 (Sturgeon County 2017) which regulates and control the use and development of land and buildings within Sturgeon County
- Alberta's Industrial Heartland Area Structure Plan Bylaw 1118/07 (Sturgeon County 2007) which reviews and update ASP Bylaw No. 900/00 in accordance with Sturgeon County's Terms of Reference

The Project is located within the IH-DIZ in Sturgeon County. A variety of operational policies and guidelines were developed for operators located within the IH-DIZ, related primarily to air, water and soil storage and will apply to the Project.

19 Potential Effects

19.1 List of Changes that May Be Caused to Environment Components Under Federal Legislative Authority

The Project is not expected to have effects on fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act* or aquatic species as defined in subsection 2(1) of the *Species at Risk Act.* With the implementation of mitigation, the Project is expected to have negligible effects on migratory birds as defined in subsection 2(1) of the *Migratory Birds Convention Act*, 1994.

19.2 Overview of Other Environmental Effects

The Project consists of the development of the power generation facility. In addition, the Project requires a power transmission line (to be developed by AltaLink), and natural gas pipeline (to be developed by Pembina Pipeline Corporation), and supporting ancillary infrastructure that will be regulated provincially. Potential effects of the Project on the biophysical environment and proposed mitigation measures are summarized in Table 19.1.

Table 19.1 Summary of Potential Effects, Effect Pathways and Mitigation Measures

Component	Potential Effect	Effect Pathways	Potential Mitigation Measures
Air Quality	Change in air quality	• Air contaminant emissions from equipment and vehicles burning hydrocarbon fuel during construction activities • Dust generated during soil stripping and grading and through vehicle and equipment movement on the construction footprint and unpaved roads • Air contaminant emissions from hydrocarbon fueled equipment (e.g., combustion turbine) during operation	• Vehicles and equipment will be required to meet emission control standards • The concentration of sulphur in diesel fuel shall comply with Sulphur in Diesel Fuel Regulations. • Construction vehicle idling times will be reduced to the extent possible to reduce emissions. • All work shall be conducted in a manner that minimizes the raising of dust from construction or maintenance operations. • Dust control measures such as watering roads to suppress dust distribution and ceasing operations during periods of high winds will mitigate the distribution of particulate matter during construction activities. • Disturbed surfaces will be revegetated promptly following construction to prevent wind erosion and to control dust. • Surfaces of temporary soil and overburden stockpiles will be stabilized during extended periods between usage, by means of vegetating or covering the exposed surfaces. • Operational emissions will meet ambient air quality objectives and industry standard best practices including the Guidelines for the Reduction of Nitrogen Oxide Emissions from Natural Gas–fuelled Stationary Combustion Turbines (ECCC 2017) and Alberta Air Emission Standards for Electricity Generation (Alberta Environment [AENV] 2005). The Project is being designed consistent with best available control technology to minimize emissions and potential impacts on air quality. Emissions of $PM_{2.5}$ and SO_2 are very low due to use of clean burning natural gas which contains only negligible amounts of sulphur. • The combined cycle power facility will include advanced pollution control technologies to minimize emissions.

Component	Potential Effect	Effect Pathways	Potential Mitigation Measures
Acoustic Environment	Change in existing sound levels; and may cause noise annoyance	• Noise emissions from stationary and mobile equipment used to construct the power generation facility • Noise emissions from operation of the power generation facility	• Construction activities will be limited to the daytime period. • Noise abatement equipment on vehicles and machinery will be maintained in good working order. • Minimize vehicle and equipment idling. • Siting construction staging and laydown areas to avoid or reduce adverse impact to sensitive receptors where possible. • Install equipment enclosures for equipment such generators and compressors used during construction. • Minimize simultaneous operation of heavy equipment where possible. • Reroute construction and truck traffic, when possible. • Notify residents near to high noise generating activities (e.g., pile driving) prior to construction. • A complaint response procedure will be implemented to address noise complaints should they arise. • Enclosures may be used on dominant noise emission equipment during operations to reduce noise emissions. • Procure equipment with low noise rating. • Incorporate noise attenuation measures on equipment during design.

Component	Potential Effect	Effect Pathways	Potential Mitigation Measures
Geology and Hydrogeology	Change in groundwater quality or quantity	• Disturbance to soil and parent material above or below the water table may change physical hydraulic properties • Alteration of shallow groundwater levels or flow rates through dewatering or diversion • Disturbance of pre-existing contamination (if discovered) • Accidental spills	• Monitor water levels in all open excavations. • Limit the amount of time that a trench or excavation is left open. • Discharge water away from drainage courses, water bodies and wetlands; appropriate locations for discharge will be identified during construction by a qualified environmental monitor. • Monitor the water discharge site for signs of erosion, saturation of the discharge site, or flow off of the approved release area. Suspend dewatering and apply erosion control measures, reduce the flow or move the discharge site if it appears that the above effects are occurring. • In the event that contaminated or potentially contaminated soil or water is encountered, implement contamination management and contingency plans. • Develop and implement procedures to manage the risk of spills. • In the event of a spill, efforts to contain, remove or remediate any contaminant(s) causing environmental effects shall be completed. • Spill response procedures and reporting will be completed in conformance with applicable federal and provincial requirements. • Secondary containment will be used for refueling and spill trays will be placed under stationary equipment located in areas where groundwater is close to surface. • Groundwater monitoring programs will be implemented during operation as required.
Surface Water and Fish and Fish Habitat	No predicted interaction	• N/A	• No unmitigated flows will be directed to nearby waterbodies based on the existing land development and the natural vegetative buffers between the PDA and nearby waterbodies. • In the event stormwater needs to be released, it must first meet *Environmental Protection and Enhancement Act* water quality guidelines, before being released. The release of stormwater will be designed to maintain existing drainage patterns so adjacent properties are not affected.

Component	Potential Effect	Effect Pathways	Potential Mitigation Measures
Soils	Change in soil quality and quantity	• Soil volume loss through wind and water erosion during clearing, grading, and soil handling • Compaction, rutting, or loss of soil structure during vehicle and equipment movement and hauling • Loss or alteration of soil through admixing during grading and soil handling activities • Soil contamination through disturbance of pre-existing contamination (if discovered), contaminated dust accumulation, or accidental spills • Alteration of terrain contours including soil subsidence through grading or trenching/excavation	• Maintain an intact ground surface in areas where grading is not warranted. • Topsoil stripping will be suspended during excessively wet soil or high wind conditions. • Suspend motorized vehicle traffic during excessively wet soil conditions and/or if the potential exists for topsoil/subsoil mixing due to rutting. Confine traffic to well-sodded, well drained, or frozen lands during excessively wet soil conditions to minimize compaction, rutting or loss of soil structure. • Salvage soil during construction to preserve soil quality as indicated in the Topsoil Conservation Use Plan. • A soil qualified environmental professional or designate will be onsite during construction to monitor, direct, and confirm salvage procedures in the Topsoil Conservation Management Plan. • Salvaged soils are not to be stored in low areas that could be affected by spring break-up. • To the extent practical, backfill and compact the trench in lifts where no trench crown will be permitted if activities occur during non-frozen conditions. • Regrade areas with vehicle ruts, erosion gullies, or where the trench has settled. When required, the replaced seedbed will be scarified to facilitate lodging and germination of seed. • Following an adverse weather event, the Contractor will confirm the efficacy of erosion and sediment control measures and whether corrective action is required. • Grades will be restored and surface water drainage patterns will be re-established to pre-construction contours or stable grade unless otherwise directed by the appropriate regulatory body. • A Soils Contingency Plan will be developed. In the event soil is suspected to be contaminated is encountered during construction, the Soils Contingency Plan will be implemented. • Monitor disturbance areas and stockpiles during operation for weeds and signs of sedimentation and erosion and address appropriately where required following the Erosion and Sediment Control (ESC) Plan.

Component	Potential Effect	Effect Pathways	Potential Mitigation Measures
Soils (cont'd)	Continued from above	Continued from above	• Store soil on site until reclamation activities during decommissioning and abandonment phase. • In areas where topsoil segregation occurred, the subsoil will first be replaced and the topsoil spread uniformly over the area from which it was removed. If multiple lifts of soil were salvaged to maintain soil quality, these must be replaced in their original order to limit admixing.
Vegetation and Wetlands	Change in vegetation communities and species	• Direct loss and/or alteration of native vegetation communities or plant species of conservation concern arising from clearing and ground disturbance • Indirect change in vegetation communities or species through introduction and spread of weeds from materials and vehicle and equipment movement	• Equipment will arrive for work in a clean condition free of soil or vegetative debris, and in good working condition free of leaks to reduce the risk of introduction of weeds or soil pathogens, or contaminants • Areas previously identified as having noxious and invasive weed infestations will be flagged before commencement of site preparation activities of site preparation (i.e., clearing, topsoil salvaging, grading) activities • Topsoil windrows will be monitored for weed growth during nonfrozen soil conditions and implement corrective measures, if warranted • Weed monitoring, soil pathogen testing, and control measures will be implemented during construction and operation, as required and deemed necessary by the construction inspector. • Clean-up activities will be implemented following completion of construction.
	Change in wetlands	• Direct loss and/or alteration of wetland vegetation arising from vegetation clearing and ground disturbance • Change in hydrological regime, storage capacity or overall function	• Vegetation removal and disturbance to wetlands will be minimized to the extent possible. • Dewatering of construction areas, if necessary, will be directed to areas that avoid effects to wetlands. • *Water Act* application and approval will be required for wetland areas which will be graded and removed, as well as any wetland permanently impacted by construction activities, including change to a catchment that alters a wetland. Wetlands permanently impacted from the PDA will be compensated for, as per the requirements of the Alberta Wetland Policy. • Surrounding wetland boundaries will be marked prior to clearing. • Clearing of trees around surrounding retained wetlands will be limited to the area required to complete the construction. • Where practical, stumps will be left in place, particularly on slope or around retained wetlands to provide surface stability.

Component	Potential Effect	Effect Pathways	Potential Mitigation Measures
Vegetation and Wetlands (cont'd)	Continued from above	Continued from above	• Only required grading will be done within wetland boundaries. Temporary workspace will not be sited or used within the boundaries of wetlands, unless required for site specific purposes. • Grading will be directed away from retained wetlands. • Natural recovery will be the preferred method of reclamation in any temporarily disturbed wetlands.
Wildlife and Wildlife Habitat, Including Species at Risk and Migratory Birds	Change to habitat	• Direct loss or alteration of habitat from vegetation removal and ground disturbance • Indirect loss or alteration of habitat effectiveness through sensory disturbance • New habitat creation during operations (e.g., structures available to raptors and corvids as perches or for nesting)	• Activities will be restricted to the PDA to minimize habitat loss. • Prior to start of clearing, clearly mark all sensitive resources and associated buffer areas according to the Project-specific documentation. • Minimize the extent of temporary workspace within sensitive environmental features and areas (e.g., wetlands, riparian areas). • During construction, the use of site flood lighting during the migration periods (i.e., April to May and late August through October) will be limited. • Minimize vehicle and equipment idling. • Facility lighting will be as efficient as possible, while providing enough light to make the site safe and secure. • Perimeter lighting will be directed inward towards the power generation facility to minimize light trespass to the environment and surrounding areas as much as possible.
	Change in movement	• Alteration or impediment of wildlife movement due to physical barriers (e.g., open trenches), or vegetation removal (i.e., gaps in forested habitat)	• Implement mitigation to reduce change to habitat (see above). • Limit the amount of time that a trench is left open, or a barrier of trenches/open pits are left open.

Component	Potential Effect	Effect Pathways	Potential Mitigation Measures
Wildlife and Wildlife Habitat, Including Species at Risk and Migratory Birds (cont'd)	Change in mortality risk	• Ground disturbance and vegetation clearing resulting in physical destruction of key habitat features (e.g., nests, dens, hibernacula) • Vehicle and equipment movement and ground disturbance resulting in accidental mortality of small, less mobile species or individuals (e.g., small rodents, amphibians, reptiles, juvenile birds) • Trapped wildlife (i.e., excavation areas) • Vehicle-wildlife collisions • Wildlife-human conflict	• Do not harass or feed wildlife. Personnel are prohibited from hunting, possessing, or feeding wildlife on the Project site during construction and operation. • Do not permit personnel to have dogs or other pets on the work area. • Vegetation clearing will occur outside of the breeding period for migratory birds when feasible. • If construction activities or clearing are planned during the migratory bird breeding period or raptor breeding period, complete nest searches no more than 7 days prior to undertaking the activity. If an active nest is found, implement site-specific mitigation (e.g., setback buffers) according to the direction of a qualified wildlife professional. • If construction or clearing activities are planned during the active period for amphibians, install exclusion fencing near key amphibian habitat (e.g., suitable breeding wetland). Amphibian search, salvage, and relocation may be required and should be completed during the direction of a qualified wildlife professional. • A daily survey of excavations and trenches (i.e., prior to construction each day) will be completed to verify that no wildlife has become trapped. • Establish construction traffic speed limits on access roads to reduce the risk of collisions with wildlife. • Collect waste generated from the work site (e.g., construction garbage, food, industrial waste) on a regular basis and dispose at an approved facility to avoid attracting wildlife. Appropriate waste containers will be available on site. • In the event of a discovery of a wildlife species at risk or species of management concern, or key habitat features during construction, report sightings to the Environmental Inspector. Appropriate mitigation measures will be established in consultation with the Environmental Inspector, qualified wildlife professional and the appropriate regulatory authorities, if warranted. • An assessment of construction traffic will be completed prior to the start of construction and will inform any additional mitigation measures necessary.

20 Changes on Federal and/or Extra-Provincial Lands

The Project is not located on federal lands and is not predicted to interact with federal lands. The nearest federally owned lands to the Project are the Redwater Department of Defense Military Base (approximately 15 km northeast). The nearest Indigenous lands to the Project are associated with the Alexander 134 reserve (45 km) and Enoch Cree Nation No. 135 reserve (47 km).

Given the size of the Project and the localized effects on air quality, acoustic environment, geology and hydrogeology, surface water, fish and fish habitat, soils, vegetation and wetlands, and wildlife, the Project is not anticipated to have adverse environmental effects on federal lands or lands or waters outside of Alberta or Canada, including the marine environment (i.e., federal waters) or boundary waters.

21 Potential Effects on Traditional Land Use, Physical and Cultural Heritage, and Historical, Archaeological and Palaeontological Resources

21.1 Indigenous Land Use

GECLP acknowledges that the Project is located in an area where Indigenous groups may practice rights. These groups include Paul First Nation, Enoch Cree Nation, Beaver Lake Cree Nation, Kehewin Cree Nation, Alexander First Nation, Saddle Lake Cree Nation, Whitefish/Goodfish Lake First Nation, Buffalo Lake Métis Settlement, Kikino Métis Settlement, and Lac Ste. Anne Métis Community Association. It is anticipated that additional information regarding actual Indigenous land use in the area will be identified as part of the provincial permitting application process. GECLP also recognizes that additional Indigenous groups, including Métis groups, may practice traditional land use around the PDA.

GECLP will continue to work with Indigenous communities to understand how individual Indigenous groups wish to be consulted and to gather preliminary information on Indigenous interests and concerns.

Currently there are no sites or structures of historical, archaeological, paleontological, or historical significance on record in the PDA and PDA lands are not included in the Alberta *Listing of Historic Resources* (Spring 2025 version; AACSW 2025).

Traditional land and resource use that currently is practiced by Indigenous groups in the vicinity of the Project include hunting, fishing, trapping, traditional plant uses, and cultural transmission (e.g., spiritual growth). While there may overlap between the PDA and ancillary infrastructure and these Indigenous uses, the effects are anticipated to be limited to construction and are expected to be temporary. Construction will occur over three years, limiting access to areas where construction activities are occurring will be necessary for the safety of the public. Communication will be ongoing with all land users including those who may engage in Indigenous practices to identify areas of concern and overlap. Adverse effects to current use of lands and resources for Indigenous purposes are not anticipated for the PDA as this area is already zoned for industrial use and is located on private land. Access is limited to the PDA as it is currently predominantly cultivated, which provides limited natural vegetation and habitat for wildlife and also Indigenous land uses.

21.2 Historical Resources

Archaeological Site FkPh-50 will be impacted by the Project. Site FkPh-50 has been assigned an historic resource value of 0 by AACSW meaning it has no remaining archaeological value (AACSW 2023a; Alberta Geospatial Portal 2025; Leyden 2007). A former homestead or farmyard located in the southeast corner of the PDA was previously recorded in 2006 under archaeological permit 06-184. Two buildings (HS99929 and HS99930) were recorded within the Alberta Register of Historic Places (Alberta Heritage Survey Program 2025; Leyden 2007). Based on review of aerial photos, the buildings were removed by 2010. There are no further concerns relative to the Project effects on known and previously recorded historical resources.

AACSW will issue regulatory correspondence following a review of the Historic Resources application. If all requirements and/or conditions issued under the *Historical Resources Act* (HRA) are fulfilled, then no residual effects relative to historical resources should occur. Project approvals issued under the HRA, however, are conditional relative to Section 31 of the HRA (AACSW 2023b), which addresses accidental/chance discoveries of historical resources during construction and operation of the Project.

22 Potential Effects on Indigenous Health, Social, and Economic Conditions

The environmental effects of the construction and operation of the Project on lands outside of the PDA and within the IH-DIZ are expected to be negligible. Therefore, effects to Indigenous peoples are also expected to be negligible. Changes to the environment, including soil, vegetation and wetlands, wildlife, and heritage resources are expected to be mostly localized to within the PDA, and the Project is not expected to have effects on the aquatic environment. Effects to air quality, noise, and human health are likely to extend beyond the PDA but are not expected to exceed regulatory guidelines for their respective parameters, once appropriate mitigation is implemented. Effects on the socio-economic environment will also extend beyond the PDA but are expected to be positive as a result of the economic benefits of the Project, and effects to social services can be managed through existing infrastructure. Effects on Indigenous peoples, including effects to health and socio-economic conditions, physical and cultural heritage, any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance, and the current use of the land and resources for traditional purposes (current use) are expected to be negligible.

In addition, GECLP is developing a participant involvement plan (see Section 4) that includes identifying and participating in long-term, meaningful processes to promote economic prosperity for the Indigenous groups. Socio-economic effects are anticipated to be generally positive for Indigenous groups due to opportunities for employment.

Currently, there is one known archaeological site, FkPh-50 within the PDA. The site has been assigned an HRV 0 by AACSW meaning that it has no archaeological significance and does not warrant further investigation. Two previously recorded heritage structures were identified in 2006 but have since been removed by 2010. No paleontological sites have been identified within the PDA. A Historical Resources Application was submitted May 16th, 2025, on behalf of the Project recommending no further investigation at this time due to the previous level of assessment completed in 2006.

GECLP acknowledges that the PDA lies within an area where Indigenous groups may practice rights (Section 21.1). GECLP will continue to consult with Indigenous groups and if potential effects are identified, GECLP will evaluate the need for mitigation at that time.

23 Greenhouse Gas Emissions Associated with the Project

During Project construction and operation, GHG emissions expressed as carbon dioxide equivalent (CO_2e) are associated with carbon dioxide (CO_2), methane (CH_4), and nitrous oxides (N_2O) emissions. Net Project GHG emissions are calculated consistent with equation 1 of the *Strategic Assessment of Climate Change* (GOC 2020) and are summarized in Table 23.1.

Table 23.1 Estimated Maximum Project GHG Emissions Associated with Operation

Pollutant	GHG Emissions (tonne/year)	GHG Emission Intensity (kg/MWh)
CO_2	5654	346
CH_4	0.1	0.007
N_2O	0.1	0.006
CO_2e	5677	348

Note:
kg/MWh – kilogram per megawatt hour

Given that the Project is most likely to displace older, much less efficient natural gas-fired power generation (such as coal-to-gas units) in the Alberta electricity supply pool on a MW-for-MW basis, the operation of the Project will result in a reduction in natural gas demand for this amount of baseload electricity supply, with attendant reductions in GHG emissions from natural gas “upstream” activities such as production, processing and transmission.

24 Waste and Emissions Generated by the Project

The emissions, discharges, and wastes from the Project include the following:

- Atmospheric emissions, including:
  - Fugitive dust and fine particulate emissions will be generated from land clearing, site preparation, earth moving and material handling, and vehicles creating dust by traveling on land
  - Construction equipment (dozers, compressors, etc.) will release combustion by-products such as nitrous oxides (NOx), CO, and volatile organic compounds when they operate by combusting fuel.
  - Combustion of natural gas in the proposed CCGT and trace amounts of volatile organic compounds (NO_X, SO_2, CO, and particulate matter [PM])
  - GHG emissions during operations expressed as carbon dioxide equivalent (CO_2e) are associated with CO_2, CH_4, and N_2O emissions.
- Noise emissions during construction would be primarily related to the use of heavy equipment and trucks to clear vegetation, prepare the ground surface and install equipment; during operations, noise will be generated from gas and steam turbines and associated equipment including inlet exhaust, ventilation openings, coolers, compressors, and transformers.
- Liquid discharges from the Project during construction will include stormwater, dewatering during excavation, and sewage wastewater.
- Liquid discharges from the Project during operations will include process water, surface water runoff, dewatering during excavation and sewage wastewater.
- Solid waste from the Project during construction and operations will include domestic waste and industrial garbage, recyclables (wood, paper, metal), waste oil, hazardous waste (paint, solvents, batteries, fluorescent light bulbs, herbicides, etc.), and during operations, relief valve discharges, exhausted resin from condensate polisher.

25 References

AACSW (Alberta Arts, Culture and Status of Women). 2023a. The Listing of Historic Resources: Instructions for Use. Electronic Document available at https://open.alberta.ca/publications/listing-of-historic-resources-instructions-for-use. Accessed March 2025

AACSW. 2023b. Standard Requirements Under the *Historical Resources Act*: Reporting the Discovery of Historic Resources. Electronic Document available at https://open.alberta.ca/publications/standard-requirements-under-the-historical-resources-act-reporting-the-discovery-of-historic. Accessed March 2025

AACSW. 2025. The Listing of Historic Resources Spring 2025 Edition. Digital Data available at https://www.alberta.ca/listing-historic-resources. Accessed March 2025.

AENV (Alberta Environment). 2005. Alberta Air Emission Standards for Electricity Generation and Alberta Aire Emission Guidelines for Electricity Generation. December 2005. Available at: https://open.alberta.ca/dataset/8a05c92c-5829-455e-8048-567387b55a2c/resource/d52c3bdd-8118-455c-9f33-7e092bfd0160/download/2005-airemissionstandardsguidelineselectricity.pdf. Accessed March 2025.

AEPA (Alberta Ministry of Environment and Protected Areas). 2025. Alberta Water Well Information Database. Available at: https://www.alberta.ca/alberta-water-well-information-database. Accessed March 2025.

AER (Alberta Energy Regulator). 2024. Directive 038: Noise Control. Accessed online at https://www.aer.ca/regulations-and-compliance-enforcement/rules-and-regulations/directives/directive-038

AHS (Alberta Health Services). 2016. Edmonton Zone Map and Brochure. Available at: https://www.albertahealthservices.ca/assets/zone/ahs-zn-edmonton-map-brochure.pdf

Alberta Environment and Parks. 2022. Designated Industrial Zone (DIZ) Pilot Project. Available at: https://www.alberta.ca/industrial-heartland-designated-industrial-zone/. Accessed March 2025.

Alberta Geospatial Portal. 2025. Alberta Geospatial Services Platform Online Portal – Historical Resources Management Branch – Restricted Data. Government of Alberta Provincial Geospatial Centre. Edmonton Alberta. Accessed online at https://geospatial.alberta.ca/portal/home/index.html. Accessed March 2025.

Alberta Heritage Survey Program. 2025. Heritage Resources Management Information System. Accessed online at https://hermis.alberta.ca/ARHP/Default.aspx?DeptID=2. Accessed March 2025.

AUC (Alberta Utilities Commission). 2024. Alberta Utilities Commission (AUC) Rule 012: Noise Control. Accessed online at https://www.auc.ab.ca/rules/rule012/

DFO (Fisheries and Oceans Canada). 2025. Aquatic species at risk map. Accessed March, 2025, from: https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html.

ECCC (Environment and Climate Change Canada). 2017. Guidelines for the Reduction of Nitrogen Oxide Emissions from Natural Gas-fuelled Stationary Combustion Turbines. Available at: https://www.canada.ca/content/dam/eccc/documents/pdf/cepa/CEPA-Guidelines-CombustionTurbines-2-en.pdf

ECCC. 2023. Protocols and Performance Specifications for Continuous Monitoring of Gaseous Emissions from Thermal Power Generation and other Sources. Available at https://www.canada.ca/content/dam/eccc/documents/pdf/cepa/protocols-and-performance-specifications-for-continuous-monitoring-of-gaseous-emissions-from-thermal-power-generation-and-other-sources/23102.01-Monitoring%20of%20Gaseous%20Emissions%20from%20Thermal%20Power%20Generation-EN_V01.pdf. Accessed March 2025.

EPA (Environmental Protection Agency). 2022. Air Emissions Requirement Policy for the Industrial Heartland Designated Industrial Zone. Alberta Environment and Parks Air Emissions Requirement Policy. October 2022.

EPA. 2025. Fish and Wildlife Internet Mapping Tool. Available at: https://geospatial.alberta.ca/FWIMT_Pub/Viewer/?TermsOfUseRequired=true&Viewer=FWIMT_Pub. Accessed March 2025.

GOA (Government of Alberta). 2025. Alberta Soil Information Viewer. Soil Inventory Database (AGRASID). Accessed March 6, 2025. Available from: https://soil.agric.gov.ab.ca/agrasidviewer/

GOC (Government of Canada). 2020. Strategic Assessment of Climate Change. Available at: https://www.canada.ca/en/services/environment/conservation/assessments/strategic-assessments/climate-change.html. Accessed February 2025.

IAAC (Impact Assessment Agency of Canada). 2024. Guide to Preparing an Initial Project Description and a Detailed Project Description. Available at: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/guide-preparing-project-description-detailed-project-description.html

Leyden, J. 2007. Historical Resources Impact Assessment. Final Report. Fort Hills Energy Corporation. Sturgeon Upgrader Project Permit 2006-184. Consultant's report on file at the Historic Resources Management Branch. Edmonton, AB.

Natural Regions Committee. 2006. Natural Regions and Subregions of Alberta. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta, Edmonton, Alberta. Pub. No. T/852 264 pp. Available at: https://www.albertaparks.ca/media/2942026/nrsrcomplete_may_06.pdf. Accessed March 2025.

Pedocan (Pedocan Land Evaluation Ltd.). 1993. Soil Series Information for Reclamation Planning in Alberta. Volume 1. Alberta Conservation and Reclamation Council. RRTAC 93-7. Available from: https://era.library.ualberta.ca/items/aef9ee75-e70a-4915-8021-3fe3c64fed4a/view/0fa10840-4db3-47ac-bb7f-c8a7ccbee8c7/RRTAC-2093-7-20Volume-201.pdf

Ramboll (Ramboll Canada Inc.). 2022. Final Report: CMAQ Base Case and Future Year Modelling. Prepared for Alberta Environment and Parks. September 2022.

Stantec (Stantec Consulting Ltd.). 2010. Quest Carbon Capture and Storage Project. Environmental impact Assessment. November 2010. Available at: https://open.alberta.ca/publications/4921835

Stantec. 2021. Designated Industrial Zone Pilot Project – Air Pollution Abatement Equipment Feasibility Study. Prepared for Alberta Environment and Parks. December 9, 2021.

Stantec. 2022. Designated Industrial Zone Pilot Project—Regional Water Systems Feasibility Study. Prepared for Alberta Environment and Parks. May 9, 2022.

Statistics Canada. 2022. Health Characteristics, Two-year Period Estimates. Available at: https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310011301

Statistics Canada. 2023. (table). Census Profile. 2021 Census of Population. Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released November 15, 2023. https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E. Accessed March 3, 2025.

Stein, R. 1976. Hydrogeology of the Edmonton area, (northeast segment), Alberta; Alberta Energy and Utilities Board, ARC/AGS Earth Sciences Report 1976-01, 25 p.

Sturgeon County. 2007. Alberta's Industrial Heartland Area Structure Plan – Sturgeon County. Bylaw No. 1118/07. Available at: https://www.sturgeoncounty.ca/wp-content/uploads/2024/01/Area-Structure-Plan-Albertas-Industrial-Heartland.pdf

Sturgeon County. 2014. Sturgeon County Municipal Development Plan. Bylaw 1313/13. Accessed May 2025. Available at: https://www.sturgeoncounty.ca/wp-content/uploads/2024/01/Bylaw-1556-21-Municipal-Development-Plan.pdf

Sturgeon County. 2017. Sturgeon County Land Use Bylaw 1385/17 Adopted July 10, 2017. Accessed May 2025. Available at: https://www.sturgeoncounty.ca/wp-content/uploads/2025/05/Bylaw_1385-17_Full_Document_20250521.pdf