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

Prepared for:
Greenlight Electricity Centre Limited Partnership

July 2025

Prepared by:
Stantec Consulting Ltd.

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Acronyms / Abbreviations

$\mu g/m^3$	micrograms per cubic metre
µm	micrometre
AAAQO/G	Alberta Ambient Air Quality Objectives/Guidelines
AACSW	Alberta Arts, Culture and Status of Women
AB	Alberta
ACC	air-cooled condenser
ACIMS	Alberta Conservation Information Management System
ACO	Aboriginal Consultation Office
AENV	Alberta Environment
AEP	Alberta Environment and Parks
AEPA	Alberta Ministry of Environment and Protected Areas (formerly Alberta Environment and Parks [AEP] and Alberta Environment (AENV)
AER	Alberta Energy Regulator
AESCC	Alberta Endangered Species Conservation Committee
AESO	Alberta Electric System Operator
Agency	Impact Assessment Agency of Canada
AIES	Alberta Interconnected Electric System
AQHI	Air Quality Health Index Report
ASL	ambient sound level
AUC	Alberta Utilities Commission
AWA	*Alberta Wildlife Act*
BOP	balance of plant
°C	Celsius
CCS	carbon capture and storage
CCGT	combined cycle gas turbine
CER	Clean Electricity Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CH_4	methane

COP	Code of Practice
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
dBA	A-weighted decibels
DFO	Fisheries and Oceans Canada
DIZ Framework	Designated Industrial Zone regulatory framework document
DPD	Detailed Project Description
ECCC	Environmental and Climate Change Canada
EPEA	*Environmental Protection and Enhancement Act*
ESC	erosion and sediment control
FAP	Fort Air Partnership
FWIMT	Fish and Wildlife Information Mapping Tool
FWMIS	Fisheries and Wildlife Management Information System
GECLP	Greenlight Electricity Centre Limited Partnership
GHG	greenhouse gas
GJ/day	gigajoules per day
GOA	Government of Alberta
GOC	Government of Canada
ha	hectare
HAMP	Heartland Air Monitoring Partnership
HRA	*Historical Resources Act*
HRSG	heat recovery steam generator
HRV	historic resource value
IA	impact assessment
IAA	*Impact Assessment Act*
IAAC	Impact Assessment Agency of Canada
igpm	imperial gallons per minute
IPCC	Intergovernmental Panel on Climate Change
IH-DIZ	Industrial Heartland – Designated Industrial Zone
km	kilometre
kV	kilovolt
L	litre
LAIRT	Landscape Analysis Indigenous Relations Tool

LEG	Low Emitting Generation
m	metre
m^3	cubic metre
m^3/day	cubic metre per day
Mt	megatonne
MW	megawatt
N_2	nitrogen
N_2O	nitrous oxides
NH_3	ammonia
NIA	noise impact assessment
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
NSR	Natural Subregion
OEM	original equipment manufacturer
PAH	polyaromatic hydrocarbon
PDA	Project Development Area
Pembina	Pembina Pipeline Corporation
PIP	Participant Involvement Plan
PLA	*Public Lands Act*
PM	particulate matter
PM_{10}	particulate matter 10 microns or less in diameter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
ppm	parts per million
PSL	permissible sound level
Q1	first quarter
Q2	second quarter
Q3	third quarter
RAP	restricted activity period
RNM	Regional Noise Model
RNMP	Regional Noise Management Plan
ROW	right-of-way
SARA	*Species at Risk Act*

SCR	selective catalytic reduction
SO_2	sulfur dioxide
SOCC	species of conservation concern
TDS	total dissolved solids
TF/EE	transboundary flows/exceptional events
the Project	Greenlight Electricity Centre Project
t/GWh	tonnes per gigawatt hour
TSP	total suspended particulate
ULN	ultra-low Nox
VC	valued component
VOC	volatile organic compound
W4M	west of the fourth meridian

Part A: General Information

1 The Project's Name, Type or Sector and Proposed Location

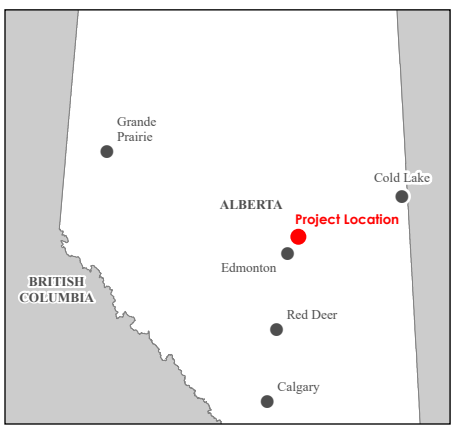
Greenlight Electricity Centre Limited Partnership (GECLP) is pleased to submit this Initial Project Description for the Greenlight Electricity Centre Project (the Project). This Initial Project Description has been prepared following the Impact Assessment Agency of Canada (Agency) Guide to Preparing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

The Project is a combined cycle power generation facility that will feature four 1x1 gas/steam turbine line ups (units), utilizing class H combined cycle gas turbines (CCGT) supplied with pipeline specific natural gas. Each line up will produce up to approximately 466 megawatts (MW), for a total plant output of 1864 MW (the power generation facility). In order to fuel the power generation facility, natural gas will be supplied from a pipeline tied to the existing Pembina Pipeline Corporation (Pembina) Alliance Pipeline natural gas distribution network (Alliance Pipeline network). The Project will require up to 297,272 gigajoules per day (GJ/day) of pipeline specific natural gas as fuel, with an estimated net plant efficiency between 55-65%. The waste heat from the gas turbine exhaust will be utilized in Heat Recovery Steam Generators (HRSG) to produce steam that will ultimately power the steam turbine (cogeneration). 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 electricity produced will be put into the Alberta Provincial Grid to meet the electric power requirements of the province and to supply data centres. The Project will connect to the Alberta Independent Electric System (AIES) via a T-tap connection to the existing 240 kilovolt (kV) transmission line 942L. Make-up water, required for the steam cycle, will be sourced locally from Sturgeon County. Other components of each power train include an air-cooled condenser (ACC) and a generator step-up transformer. The principal components are described more fully in Section 9.1, Project Components.

The Project is in the Alberta Industrial Heartland – Designated Industrial Zone (IH-DIZ) located on private land that is approximately 98 hectares (ha), of which, 65 ha is allocated for Project infrastructure and 32 ha are available for storage and laydown area. The Project is in the northeast and southeast quarter sections of Section 10 Township 56 Range 22 W4M approximately 8.5 kilometres (km) east of Gibbons, Alberta in Sturgeon County. A portion of the southeast quarter sections of Section 10 Township 56 Range 22 W4M will be used for laydown area and storage. Together, this area makes up the Project Development Area (PDA). The PDA does not include the associated third-party ancillary infrastructure, including the transmission line or natural gas pipeline as routing assessments are still in development. All Project components, including ancillary infrastructure, are located within the province of Alberta. The location of the Project is provided in Figure 1.1 and a conceptual layout showing the location of the Project components are shown in 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

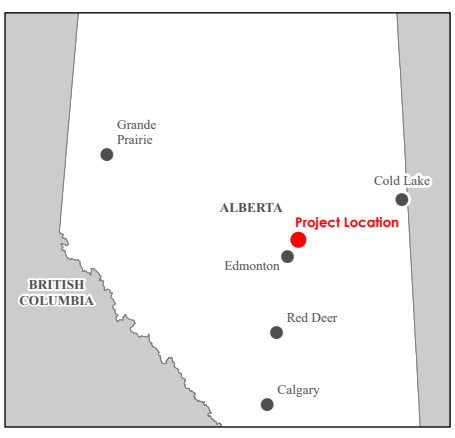
RANGE RD 222

SW-11-056-22W4

NW-03-056-22W4

NE-03-056-22W4

NW-02-056-22W4



Notes

1. Coordinate System: NAD 1983 3TM 114

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 Proponent's Name and Contact 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 Engagement with Jurisdictions or Agencies

Federal, provincial, and municipal agencies that have been consulted regarding the Project are listed in Table 3.1. Engagement with agencies and stakeholders will continue throughout the development of the Project.

Table 3.1 Federal, Provincial and Municipal Agencies Engaged

Agency	Date	Purpose of Engagement	Outcome/Issues Raised
Federal			
Impact Assessment Agency of Canada	July 2023 - ongoing	Introduction of Project, confirmation of Project classification, and obtain list of Indigenous groups to consult	Updates regarding timing for starting *Impact Assessment Act* review and submission schedule
Provincial			
Alberta Arts, Culture and Status of Women (AACSW)	May 2025	Request for Historical Resources Act approval for Project	Submission of Historic Resources application and Statement of Justification
Alberta Electric System Operator (AESO)	June 2023 - ongoing	Connecting the Project to the provincial grid	Application has been submitted
Alberta Environment and Protected Areas (AEPA)	June 2024 - ongoing	Introduction of Project and determination on requirement for a provincial environmental impact assessment	Initial contact made to provide basic Project information
Alberta Utilities Commission (AUC)	June 2024	Introduction of the Project to the Alberta power generation regulator	Initial contact made to provide basic Project information
Aboriginal Consultation Office (ACO)	May 10, 2023	Determination of Indigenous engagement requirements	Project is on private land. ACO states no consultation required
Alberta Transportation and Economic Corridors	Contact will be initiated in approximately the third quarter of 2025	Notification of Project and planning for transportation requirements	None
Municipal			
Sturgeon County	May 2023 - ongoing	Notification to the County to introduce the Project	No issues raised by Sturgeon County. They indicated support for the Project and attended the open house in July 2023
Government and Industry Collaboration			
Alberta's Industrial Heartland Association	July 2023 - ongoing	To gain support for the Project	GECLP is working with Alberta's Industrial Heartland Association, which has offered support for advancing the Project

4 Engagement with Indigenous Groups, Public, Other Stakeholders

4.1 Engagement with Indigenous Groups

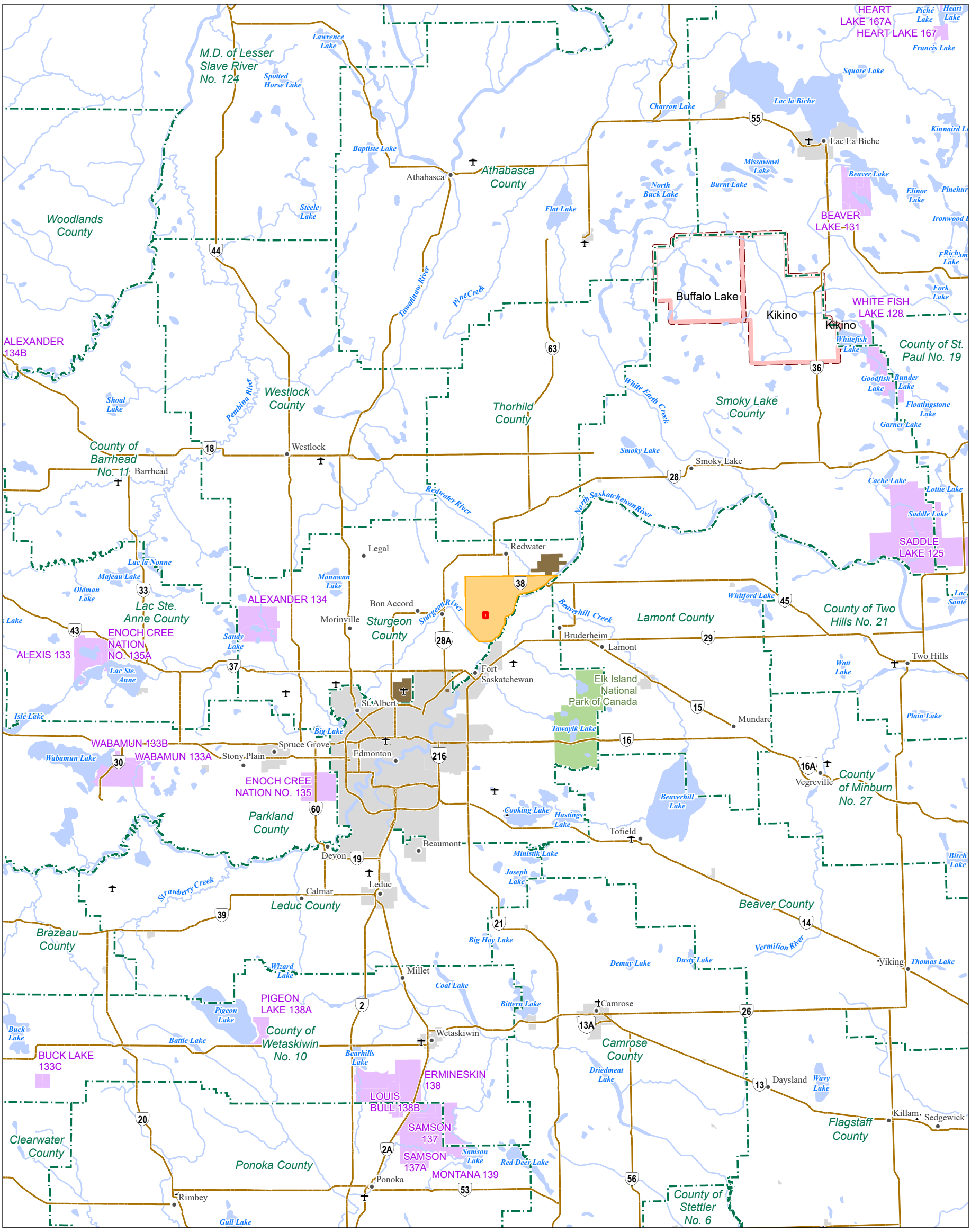
GECLP acknowledges and respects the rights of Indigenous people. In July 2023, GECLP began identifying Indigenous groups located in proximity to the Project using both federal and provincial resources. An initial contact list was created and GECLP has begun the early engagement process through sending letters of introduction, offering meetings, and sharing Project information.

GECLP 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. GECLP hosted a Project open house on Thursday June 26, 2025 at the Gibbons Cultural Centre, offered site visits to those Indigenous groups within 3 km of the proposed PDA, and requested input from all identified Indigenous groups regarding the Project and will continue to provide Project updates to all identified Indigenous groups.

4.1.1 Indigenous Groups

A total of 18 Indigenous groups have been identified to be engaged and consulted on this Project through the Landscape Analysis Relations Tool (LAIRT) and Impact Assessment Agency of Canada (IAAC). The Indigenous groups are shown on Figure 4.1.

An initial review of potential effects of the Project on Indigenous groups is included in Sections 19, 21, and 22.



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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4.1.1.1 Landscape Analysis Indigenous Relations Tool

In May 2025, the Project team utilized the Government of Alberta's online LAIRT mapping tool to understand which Indigenous groups may practice rights in the PDA. A total of ten groups were identified:

- 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

4.1.1.2 Impact Assessment Agency of Canada Direction

In July 2023, GECLP initiated correspondence with IAAC to determine if the Project would be considered a Designated Project under the *Impact Assessment Act* (IAA). Upon confirmation, the Project team requested federal advice to identify and confirm which Indigenous groups have claims, known traditional territory, treaties, or agreements in proximity to the Project.

In addition to the ten Indigenous groups identified in Section 4.1.1.1, IAAC identified an additional eight Indigenous groups:

- 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

4.1.2 Engagement Activities Undertaken

4.1.2.1 Introductory Letters and Responses

Letters of Introduction were sent to the eighteen Indigenous groups identified by LAIRT and IAAC in May 2025. The letter introduced GECLP, provided a high-level description of the Project, and invited groups to meet with the Project team. Included with the letter is a Project newsletter, see Appendix A, that provides general Project information including a Project schedule.

4.1.2.2 Site Visits and Open Houses

GECLP hosted the first Project Open House on July 26, 2023. No representatives from any Indigenous groups attended the July 2023 Open House.

The Letter of Introduction sent by GECLP (see Section 4.1.2.1) extended an invitation for a field visit to the proposed site including offer for providing resources to Enoch Cree Nation and Paul First Nation. These visits have not been confirmed.

A second open house was conducted to provide further introduction and update regarding the Project on Thursday June 26, 2025. All 18 Indigenous groups were invited via letters addressed to each Indigenous group. No Indigenous groups came to the open house. As of July 2025, GCELP has not received feedback about the Project from any Indigenous groups.

4.1.3 Results of Engagement and Key Issues Raised

As of July 2025, GCELP has not received feedback about the Project from any Indigenous groups.

4.1.4 Plans for Future Engagement

GECLP is committed to engaging with all potentially affected Indigenous groups throughout the life of the Project. GECLP will work with identified Indigenous groups to support Indigenous knowledge and Indigenous land use studies for inclusion in any impact assessments required for the Project. Proposed engagement and notification delivery methods 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, toll-free line and project-specific email address
- Participation in community events to promote informal dialogue regarding the Project

Should Indigenous groups not identified by the LAIRT or IAAC 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 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 will continue to engage with all Indigenous groups identified in Section 4.1.1 throughout the life of the Project. GECLP plans to send out quarterly updates on the Project, which will be sent to the public and Indigenous groups.

GECLP has developed a Participant Involvement Plan (PIP), which is guided by the principles of respect, understanding, trust and mutual benefit. Information collected via the PIP will be used in developing the regulatory applications.

GECLP's approach to engagement includes enhancing their understanding of Indigenous groups' issues, identifies options for their resolution, and allows for appropriate choices for the future. Where possible, engagement processes will be refined to meet Indigenous groups' requirements. The intent of the information collected via the PIP is to enable GECLP to build long-term relationships with Indigenous groups in close proximity to the PDA, representing a positive investment in the Project's future. Goals for the Information collected via the PIP are to: enhance the understanding of Indigenous culture and rights provide Indigenous groups with clear and timely Project information

Project specific issues and concerns provide opportunities to discuss any issues or concerns, gather feedback and incorporate feedback into the Project design where possible build long-term mutually beneficial relationships identify and participate in long-term, meaningful processes to promote economic prosperity.

4.1.5 One-on-one Meetings

GECLP will organize and facilitate one-on-one meetings with Indigenous groups if requested. These meetings provide a confidential opportunity to discuss specific topics in greater detail. Meetings will occur in-person or virtually as requested.

4.1.6 Open House and Community Meetings

Project information will be communicated and local information gathered through community meetings for Indigenous groups. If requested, community meetings will be planned collaboratively with Indigenous groups to meet the individual needs of their community, provide opportunities for subject matter experts to answer questions, and provide opportunity for Indigenous groups to meet GECLP. A second Project Open House was conducted on June 26, 2025 with no Indigenous attendees.

4.1.7 Communication Material

Project information will be developed in plain language and communicated in graphics where appropriate to help explain technical details. Project information will take different forms including newsletters, story boards, presentations, maps, and hand-outs. Project information will be posted on an easy to access and easy to navigate Project website (https://kineticor.ca/operation/greenlight-electricity-centre/). This website includes contact information to gather questions regarding the Project. GECLP will respond to questions posed directly to a Project team member or through the website in a timely fashion. All questions and responses will be tracked. Project updates will be provided to identified Indigenous groups in the format of emails and/or newsletters. These will include brief, plain language updates at Project milestones. Photos and/or graphics will be included to help explain technical aspects of the information. The first Project newsletter has been developed and provided to Indigenous groups (see Appendix A).

Feedback from meetings and questions will be documented and used to update the Project engagement, planning, and communication material. Efforts will be made to identify comments, concerns, and questions with the originating stakeholder group and Indigenous group.

4.2 Engagement with Public and Other Stakeholders

4.2.1 Identified Stakeholders and Interested Parties

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 land upon which the Project will be located is private land. Table 4.1 lists the potentially affected and interested stakeholder groups for the Project.

Table 4.1 Potentially Affected and Interested Stakeholder Groups

Directly Affected Stakeholders • Occupants, landowners, and residents
Nearby / Adjacent Stakeholders • Occupants, landowners, and residents
Federal Government • Local Member of Parliament in Sturgeon County, Impact Assessment Agency of Canada
Provincial Government • Member of the Legislative Assembly of Sturgeon County; Alberta Environment and Protected Areas; Alberta Aboriginal Consultation Office; Alberta Arts, Culture and the Status of Women; Alberta Utilities Commission, Alberta Transportation and Economic Corridors, Alberta Energy Regulator, and Alberta Electric System Operator
Local / Regional Government • Sturgeon County, Alberta
Government and Industry Collaboration • Alberta's Industrial Heartland Association
Others Interested Groups • Trappers, caveats, disposition holders • Special interest/advocacy groups • Area recreational users or interests • Regional associations • Community groups • Local businesses

4.2.2 Engagement Activities Undertaken

4.2.2.1 Introductory Packages and Responses

Introductory packages were sent via email or regular mail to 37 landowners located within 3 km of the PDA in July 2023. The package introduced GECLP, provided a high-level description of the Project, and invited groups to meet with the Project team.

Of the landowners contacted, GECLP received no responses.

4.2.2.2 Open Houses

GECLP hosted the first Project Open House on July 26, 2023. Invitations to the Open House were sent to:

- County representatives
- Landowners
- Industry representatives

Approximately twelve stakeholders attended the first Open House. A second Project Open House was held on June 26, 2025. There were no key issues or concerns raised.

4.2.3 Results of Engagement and Key Issues Raised

The key concern expressed to date is related to proximity to existing land use. At the Open House, GECLP heard from one landowner concerned about the location of the Project in relation to their farm. 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.

4.2.4 Plans for Future Engagement

Effective and thorough public and stakeholder engagement is vital to the success of the Project and is being undertaken in support of the submission of regulatory applications. 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. Recognizing that all communities and stakeholders have unique characteristics, GECLP will demonstrate knowledge of, and respect for, the community in which the Project is proposed.

Through engagement activities, open discussion and transparent Project planning, GECLP aims to engage in meaningful dialogue with stakeholders with the intent to mitigate affected parties' Project specific concerns. The following concepts form the basis of GECLP's engagement process:

- Proactively inform all those whose rights maybe directly and adversely affected by the Project
- Maintain transparency about Project design and convey technical information in plain language
- Identify full range of interests, opportunities and concerns relating to the Project
- Provide opportunities to discuss and address identified questions and concerns
- Facilitate the discussion of options, alternatives, and mitigation strategies, providing stakeholders an opportunity to influence the Project design where possible
- Build positive long-term relationships

Implementation of the PIP is sensitive to the constraints of communities and stakeholders and provides various opportunities for stakeholders to voice their concerns or issues. GECLP will strive to work together with the communities to share information and build mutually beneficial relationships.

The PIP is being implemented with the intent of building trust, credibility, and respectful relationships with identified stakeholders and Indigenous groups that have the potential to be affected by, or interested in, the Project.

4.2.5 One-on-one Meetings

GECLP will organize and facilitate one-on-one meetings with stakeholders if requested. These meetings provide a confidential opportunity to discuss specific topics in greater detail. Meetings will occur in-person or virtually as requested.

4.2.6 Open House and Community Meetings

Project information will be communicated and local information gathered through community meetings for stakeholders. If requested, community meetings will be planned collaboratively with any stakeholder group. A second Project Open House was conducted on June 26, 2025.

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 (AEP 2022a). 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. The IH-DIZ was selected to pilot the DIZ concept primarily due to its importance as a petrochemical and chemical processing centre in the province and strong history of collaborative work between industrial, airshed and watershed associations, municipal and provincial governments to address zone-wide cumulative environmental impacts (AEP 2022a).

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), the Sasol Canada Gas-to-Liquids Project (Stantec 2013) and the TOTAL E&P Canada Ltd. Upgrader Project (Total E&P Canada Ltd. 2007). The Quest Carbon Capture and Storage Project is located approximately 5 km from the Project.

To support ongoing development in the IH-DIZ, the GOA has identified regional environmental issues, established multi-stakeholder task teams to focus on addressing these, and 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 (EPA 2022).

In addition to these regional studies, routine valued component (VC) 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 VC monitoring is done as part of provincial and federal monitoring networks such as Water Survey Canada.

6 Strategic Assessments

No strategic assessments have been carried out that are relevant to the Project. However, a Strategic Assessment of Climate Change (Government of Canada [GOC] 2020) conducted under Subsection 95(2) of the *Impact Assessment Act* could be applicable to the Project.

Part B: Project Information

7 Project Purpose and Need

7.1 Project Purpose

The purpose of the Project is to supply reliable, affordable, and dispatchable (on-demand) low-emitting generation (LEG) to Albertans.

Lower-efficiency, emissions-unabated 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 LEG 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 dispatchability (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.

7.2 Project Need

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 AI technology to drive innovation, create jobs and diversify its economy. All of which 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 PDA 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. This includes:

- Over $30 billion in existing capital investment by more than 40 companies
- Expedited regulatory process compared to other areas within Alberta while maintaining the same environmental standards
- Access to existing distribution and transmission infrastructure
- Access to existing natural gas supply for the Project

- Access to world leading carbon capture and storage infrastructure including the world's largest carbon dioxide (CO_2) pipeline
- Access to existing transportation infrastructure including both road and rail
- Distance from residential areas with ready access to a large skilled labour base

7.3 Project Benefits

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. A combined cycle power facility uses both a gas and steam turbine simultaneously to produce up to 50 per cent more electricity from the same amount of fuel than a traditional simple cycle facility. This is because much of the wasted heat from the gas turbine is recovered and converted into high-pressure steam, which drives the steam turbine and generates additional electricity.

The construction and operations of the Project will play an important role in the local economy by providing well-paying jobs that will benefit the local and Indigenous communities. It will utilize local businesses and suppliers and provide additional tax revenue to Sturgeon County. 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 be an additional source for the local municipality tax base, additional jobs through third party vendors, and maintenance workers.

8 Physical Activities Regulation

The *Impact Assessment Act*, administered by IAAC, has two regulations that are applicable to the Project:

- Physical Activities Regulations
- Information and Management of Time Limits Regulations.

The Physical Activities Regulations lists the activities and types of projects (designated projects) potentially requiring an impact assessment (IA). Section 30 of the Regulations includes the following:

> *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 is a new fossil fuel-fired power generating facility with an anticipated production capacity of 1864 MW and is therefore considered a designated physical activity under Section 30 of the Physical Activities Regulation.

The Information and Management of Time Limits Regulations set out the information that must be included in a project description. They also include criteria under which the legislated timelines can be suspended, the guidelines and plans the IAAC is required to provide to the proponent, and the format in which information should be provided to IAAC.

9 Project Activities and Physical Works

The Project component for which approval is being sought are as follows:

- Power generation facility with a capacity of 1864 MW, consisting of a CCGT and heat recovery steam generation units

The Project will require ancillary infrastructure including roads and utilities (including process/makeup and domestic water). The Project will require the addition of natural gas and transmission tie-ins that will be constructed and permitted by third-party developers:

- Transmission line interconnection (approximate length of less than 4.5 km) that will be constructed, owned and operated by Altalink
- Natural gas pipeline from the Alliance network adjacent to the PDA (approximate length between 7.5-10 km) that will be constructed, owned and operated by Alliance Pipeline network

9.1 Project Components

A description of the primary Project components is provided below.

9.1.1 Power Generation Facility

The proposed power generation facility is comprised of a principal equipment package: the Combined Cycle Gas Turbine. This is further described in the following sections. The Project is located in Sturgeon County, approximately 14 km northeast of Edmonton, Alberta and 10 km east of Gibbons, Alberta. The Project will be located on approximately 98 ha of privately owned land.

The conceptual Project layout is shown on Figure 1.2.

9.1.1.1 Combined- Cycle Gas Turbine (CCGT)

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. CCGT 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 HRSG. This steam is supplied to the steam turbine to produce additional power. As a result, combined cycle facilities are one of the most efficient and reliable generation technologies available.

The Government of Canada recently released the finalized Clean Electricity Regulations (CER) December 17, 2024, which establishes an annual emissions limit requiring generating units to meet an annual emissions limit of 65 tonnes per gigawatt hour (t/GWh) of carbon dioxide equivalent (CO_2e). The Project has been designed with flexibility to allow for the integration of carbon capture infrastructure in the future, including consideration of space allocation that could potentially support future carbon capture and storage (CCS). CCS is not currently part of the Project. However, GECLP will decide upon

design and implementation of CCS at a future date based upon market conditions and as necessary to comply with regulatory requirements such as the CER.

Pipeline quality natural gas is the only fuel that will be used for the gas/steam turbine line ups prior to entering the gas turbine, the natural gas will be heated to a temperature specified by the original equipment manufacturer (OEM). Increasing the temperature of the natural gas increases the cycle efficiency. The heated natural gas is then combusted in the gas turbine to drive the turbine to generate electricity. 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 Siemens SGT6-8000H class gas turbine utilizes state-of-the-art technology to improve efficiency and boost output. The gas turbine is equipped with ultra-low oxides of nitrogen (NOx) (ULN) burners which optimizes the ratio of combustion air to fuel as well as combustion temperature to control NOx emissions from the natural gas combustion process.

The HRSG is a waste heat boiler which produces high pressure, intermediate pressure and low-pressure steam. Amine, phosphate and ammonia (NH_3) 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. Exhaust gas exits the HRSG via the stack. The stack is estimated to be approximately 55 metres (m) high.

Steam from the low-pressure part of the turbine exhausts into the ACC. Ambient air drawn from the surroundings by fans of the ACC condenses the exhaust steam and the condensate collects in the condensate tank. Condensate is then pumped by condensate pumps and the boiler feedwater pumps to the HRSG and the steam cycle repeats. The HRSG boiler blowdown system collects continuous and intermittent blowdown from the HRSG and steam drains local to 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.

Table 9.1 lists the expected tanks, buildings, or enclosures in the PDA.

Table 9.1 CCGT Facility Buildings and Enclosures

Name	Type
Administration	Building
NH_3 Storage and Unloading	Stand alone tank
Fire Pump	Building
Gas Metering/Regulating	Building
Gas Turbine/Steam Turbine Generator	Building
Hydrogen/CO_2 Storage	Stand alone tank
Water Treatment	Building

Table 9.2 lists the total quantity of major equipment to be installed in the CCGT. This list is subject to revision based on project design.

Table 9.2 Power Generation Major Equipment

Equipment Type – Power Generation	Number to be Installed
Air Cooled Condenser	4
Air Cooled Heat Exchanger	4
Boiler Feedwater Pumps	8
Closed Cooling Water Pumps	8
Combustion Turbine Generator	4
Condensate Pumps	8
Fire Pumps	3
Fuel Gas Dew Point Heater	4
Fuel Gas Filter/Separator	5
Fuel Gas Knockout Drum	5
Fuel Gas Metering Station	1
Fuel Gas Performance Heater	4
Generator Step-Up Transformer	4
Heat Recovery Steam Generator	4
Natural Gas Compressors	0
Pumps, typically	242
Steam Turbine Generator	0
Service/Instrument Air Compressor	10
Water Treatment System	1

Process Description of the CCGT

The CCGT structures and components are summarized in Table 9.3.

Table 9.3 Project Structures and Sub-Components

Major Equipment	Details
Permanent Facilities	
Power Island Building	Building to enclose the Gas Turbine, Steam Turbine, Generator and other BOP electrical and mechanical equipment. The HRSG is exterior of the power island building, which we refer to as the Generation Building.
Multi-purpose Building	A multi-purpose building will be constructed to house the operating and maintenance staff. The multi-purpose building will include an administration/control room, warehouse, maintenance shop, and water treatment area. A permanent parking lot will be located on the west side of the multi-purpose building. The approximate dimensions of the multi-purpose building will be 110 m L x 25 m W x 10.6 m H.
Fuel Gas Yard	The fuel gas yard will consist of a pre-engineered building which will contain the gas metering equipment, closed loop glycol gas heater system where glycol is circulated to heat up fuel gas as well as a fuel gas filter/separator, and a knockout tank. This equipment will be used to prepare the natural gas for combustion in the gas turbine. The approximate dimension for the Fuel Gas Yard will be 80 m L x 40 m W.
Glycol Closed Loop and fin-fan heat exchanger	A glycol loop will be used in a closed-cycle system to cool various gas turbine and steam turbine generators, and BOP equipment. The glycol loop is cooled by a fin-fan heat exchanger.
Air Cooled Condenser	The ACC is a heat exchanger which condenses steam from the steam turbine to condensate. There will be one ACC per power train, for a total of four. The approximate dimensions for each ACC section will be 80 m L x 40 m W x 22 m H.
Underground Wash Water Drains Tank	An underground wash water drains tank will be located just outside of each power island. A 40 cubic metre (m^3) tank will collect water from the compressor wash which will be hauled off site periodically for disposal at an approved facility. The compressor wash is performed at pre-determined intervals to maintain the cleanliness of the gas turbine compressor which is directly affects overall efficiency of the gas turbine.
Water	Make-up water is primarily required for the HRSG and equipment cooling needs. Utilization of air-cooled condensers in place of water-cooled apparatus minimizes the need for make-up water. The water requirement for the Project is estimated at 1250 cubic metres per day (m^3/day) subject to final design. Water connection will be available through the local county. This water is then processed in the demineralized water facility on site to bring it up to acceptable specification. Demineralized water will be stored in demineralized water tank.
Fire/Service Water and Demineralized Water Tanks	Four fire/service water tanks will supply water for plant fire protection measures. The approximate holding capacity of each tank will be approximately 2800 m^3. A demineralized water tank with a capacity of approximately 1500 m^3 serves to improve operational reliability of the unit in the event of reduced access to demineralized water. It is anticipated that the tank will hold a nominal 2-day storage for demineralized water requirements.

Major Equipment	Details
Oil/Water Separators	Oil/water separators used to separate oil from the water that will be collected from the facility drains.
Permanent Small Buildings	The Project will include several other permanent small buildings or enclosures of varying sizes including the fire water pump, vacuum pumps, emergency diesel generator, and power distribution modules. The fire water pump building dimensions will be approximately 14 m L x 4 m W x 3 m H. The power distribution modules buildings for each unit will be approximately 20 m L x 6 m W x 3 m H. All dimensions noted above are subject to the final design
Stormwater Pond	The stormwater pond will be designed to collect surface water runoff only and will be designed for a 25-year storm event. The stormwater pond will be constructed with pond liners for the retention of liquids and prevention of leaching of water into local groundwater. Based on preliminary design, the approximate footprint of the pond will be 4,500 square metres with an approximate depth of 2 m. In the unlikely event of the pond filling up, water would be stored in the ditch system leading to the pond allowing for excess water to be slowly released to the pond as the space becomes available. If the pond and ditches were full, excess water would be released to the adjacent wetland. Prior to release, GECLP would first have the water tested by a third party lab to test that it meets *Environmental Protection and Enhancement Act* (EPEA) water quality standards. Should the water not meet these standards, GECLP would pump the water into a truck for it to be disposed of at an approved disposal site. The release of stormwater will be designed to maintain existing drainage patterns so adjacent properties are not affected. Drainage from the stormwater pond will not affect fish or fish habitat.
Site Access Road	The site access road that will be built on the Project quarter section. The access road will be an all-weather crushed rock road. The main access road will be approximately 12 m wide and will run from the Highway 643 turn off to the North boundary of the plant fenced area. GECLP will be responsible for construction which will be designed to handle heavy equipment and light vehicle traffic during construction and operations. The road will be under GECLP's owned and maintained by GECLP.
Utilities and Infrastructure	
Utilities and Infrastructure Electrical Power	AltaLink will provide a 240 kV intertie line connecting the plant to the 973/974L transmission line on the north side of the Project property. A team within AltaLink and the AESO will be responsible for routing of the powerlines, stakeholder engagement and regulatory approvals/permits and construction, operation and maintenance for the transmission line and are therefore outside of the care and control of GECPL.
Telecommunications	Telecommunications will be required for operation of the Project. The primary method of communication with the Project controls will be through a wide area network whose central medium for communication is fibre optics. AltaLink will be responsible for the fibre optic routing, regulatory approvals/permits, construction, operation, and maintenance of the telecommunications.

Major Equipment	Details
Natural Gas Infrastructure	The Project requires a natural gas supply of high pressure service to supply the gas turbines and low pressure service to supply the building heaters. At a net output of 1864 MW, the plant fuel requirements are 292,272 gigajoules or approximately 273 million cubic feet per day. A new 7 km tie-line to Alliance Pipeline Transmission Ltd. will serve as gas supply. This line will be constructed, owned, and operated by GECLP. This pipeline will be 12” to 16” in diameter subject to further design. Pipeline routing is not finalized. The pipelines will be regulated by the Alberta Energy Regulator. The plant natural gas system will begin at the downstream side of the fuel gas metering yard. An emergency stop valve, manually controlled from the control room, and local control emergency stop valve will be provided downstream of the metering yard to provide emergency shutoff capabilities in the event of an on-site gas system leak or major plant fire.

9.2 Ancillary Infrastructure

9.2.1 Power Transmission Line and Interconnection

The Project will be connected to the AIES by a transmission connection to the existing 240 kV transmission line 942L between Bannerman 691S substation and Lamoureax 71S using a T-tap configuration. This new 240 kV circuit will be approximately 4 km in length and located in a new right-of-way. Several other interconnection options were assessed for the Project.

A connection study is underway by GECLP and will be used by the AESO to make a decision based on transmission line capacity and needs assessment. The transmission line will be developed and permitted by Altalink and regulated by the Alberta Utilities Commission.

9.2.2 Natural Gas Pipeline

Natural gas will be provided by a new pipeline built to deliver approximately 292,272 GJ/day of pipeline-specification natural gas from the Alliance Pipeline network to the Project (approximately 7-10 km in length). The pipeline routing is in development; however, it is anticipated to parallel existing disturbances for the majority of the length of the pipeline route, including rights-of-way (ROW). The natural gas pipeline will be developed and permitted by Pembina and regulated by the Alberta Energy Regulator (AER).

9.2.3 Water Supply

The water requirement for the Project is estimated at 1250 m^3/day subject to final design. Water connection will be available through the Sturgeon County, from existing municipal water supply. This water is then processed in the demineralized water facility to bring it up to acceptable specification. Demineralized water will be stored in the demineralized water tank.

9.2.4 Ancillary Roads and Utilities

Available infrastructure withing the IH-DIZ is developed to allow for Project development except as identified in Section 9.1 and roads and utility piping required within the PDA.

9.2.5 Telecommunications

Telecommunication will be required for the operation of the Project. The primary method of communication will be through a wide area network whose central medium for connection is fibre optics.

9.3 Description of Project Activities

Project construction, operation and decommissioning and abandonment are discussed below.

9.3.1 Construction

Construction activities 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. Soil will be stripped and stored on site for restoration upon decommissioning and abandonment of the Project.

Initial activity will include survey and demarcation of site layout including marking of clearing boundaries, followed by surface preparation including clearing and stripping, as required. Site preparation is expected to take approximately four to five months to complete. The general sequence of the site preparation will be to commence with the main power generation facility area and the construction of the management trailer area/laydown area. The first step of site preparation involves clearing vegetation, topsoil stripping, stockpiling, and levelling the PDA to a predetermined site grade. This involves either cutting or filling the sub-soil depending on the pre-existing elevations of the landscape. The soil that is cleared will be stored on site for future decommissioning and abandonment. 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.

Duct bank and grounding grid construction and underground piping installation work will be completed during the construction of the foundations in the same area. Building construction and equipment installation will begin following the completion of foundation construction. Building construction includes mechanical electrical and switchyard construction. The major equipment will be connected by piping and cables for eventual operation. The HRSG and its stacks will conclude the mechanical installation. The bulk of electrical installation will be done in parallel to the late stages of mechanical erection. The principal activities involved in commissioning of the Project 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, stored soil will be replaced, 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

The Project will be owned by Greenlight Electricity Centre GP Ltd and operated by an operation and maintenance contractor. Day to day operation and maintenance will be provided by a staff of operators, engineers, and support staff totaling approximately 40 people. Additional support staff will be available from the operator's other natural gas plants in Alberta, as needed.

The turbine and generator manufacturer will provide major maintenance and inspection work for the turbines and generators.

Pipeline quality natural gas will be used as the only fuel for the gas/steam turbine line ups. Prior to entering the gas turbine, the natural gas will be heated to a temperature specified by the original OEM. Increasing the temperature of the natural gas increases the cycle efficiency. The heated natural gas is then combusted in the gas turbine to drive the turbine to generate electricity. 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. For this Project, an advanced H-class gas turbine has been selected for the facility. The advanced H-class turbine utilizes state-of-the-art technology to improve efficiency and boost output. The gas turbine is equipped with ULN burners which optimizes the ratio of combustion air to fuel as well as combustion temperature to control NOx emissions from the natural gas combustion process.

The temperature of the exhaust gas from the gas turbine ranges from 590°C to 630°C at the outlet of the turbine exhaust. The hot exhaust gas is ducted to the HRSG via the gas turbine exhaust transition piece to generate steam.

The HRSG is a waste heat boiler which produces high pressure, intermediate pressure and low-pressure steam. Amine, phosphate, and NH_3 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.

Exhaust gas exits the HRSG via the stack. The stack is estimated to be approximately 55 m in height.

Steam from the low-pressure part of the turbine exhausts into the ACC. Ambient air drawn from the surroundings by fans of the ACC condenses the exhaust steam and the condensate collects in the condensate tank. Condensate is then pumped by condensate pumps and the boiler feedwater pumps to the HRSG and the steam cycle repeats.

The HRSG boiler blowdown system collects continuous and intermittent blowdown from the HRSG and steam drains local to 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.

By adopting the process design above, the efficiency of the plant is approximately 58% on an annual average ambient condition on a low heating value basis. CO_2 emissions are estimated to range between 350 to 370 kg/MWh when the gas turbine operates at 100% load. As the plant ages, the unit will experience degradation which decreases the plant efficiency thereby increasing CO_2 emissions per MWh. The plant degradation curve follows a logarithmic function, reaching 1.5% in the first year and 3.6% overall at the end of the gas turbine major maintenance interval. The percent degradation corresponds to a reduction in MW output of the plant. Future degradation will be mitigated by implementing a long-term service agreement with the gas turbine supplier with contractual remedies on performance.

The use of ACC saves water consumption by more than 90% when compared to a wet cooled unit.
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 and abandonment 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 and abandonment will be adhered to. A Decommissioning and Abandonment Plan, or similar, will be developed for the Project at that time.

9.3.4 Incidental Activities

All activities undertaken as part of the Project construction and operations will be for the purpose of power generation and will be under GECLP's care and control. Activities that are incidental to the Project construction and operation that would not be under GECLP's care and control include telecommunications, provision of power and fuel to the Project, and highway access to the Project site.

10 Description of Production Processes

10.1 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 net plant output 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
2027 – 2030	Construction
Q3 2029	Start up / commissioning
Q1 2031	In service
2070-2072	Project decommissioning and abandonment (after estimated 40-year life)

If IAAC determines that a federal IA 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

12.1 Alternative Means of Carrying Out the Project

Alternative means of carrying out the Project were considered in respect of:

- Facility siting
- Power transmission and pipeline routing
- Selection of gas-fired combined cycle power generation technology – configuration and sizing
- Alternatives to meet Project cooling duties – water versus air

12.1.1 Facility Siting

GECLP evaluated several other potential locations to develop the Project, but based on its initial screening analysis, concluded that the selected area for the Project was optimal considering the factors evaluated. The locations considered proximity to off-site infrastructure including electric and gas interconnections.

The two options evaluated by GECLP are in the IH-DIZ and are shown in Figure 12.1 and Table 12.1.

Table 12.1 Potential Facility Sites Evaluated

Potential Project Locations (locations)	Quarter Sections
1	NE-9-056-21-W4M and N-10-056-21-W4M
2 (the)	NE-10-056-22-W4M and part of SE-10-056-22-W4M

Location 1 consists primarily of undeveloped land for cattle grazing with some wetland, treed and densely vegetated areas throughout and covers an area of approximately 193 ha. Location 2 (the PDA) consists of cultivated agricultural land with treed areas and wetlands located throughout the 98 ha.

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

Location 1
Project Development Area
Power Generation Facility
Temporary Workspace and Laydown
Road
Watercourse
Waterbody

0 1 2
kilometres
(At original document size of 11x17) 1:35,000

N

Stantec

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

Prepared by WH on 2025-06-13

Client/Project
123514064-0004
Greenlight Electricity Centre Limited Partnership
Greenlight Electricity Centre Project
Initial Project Description

Figure No.
12.1

Title

Potential Site Options Overview

Phase 1 environmental site assessments were completed for both sites and consisted of the following:

- Records review including, but not limited to, aerial photographs, geological and topographic maps
- Review of available environmental databases and records for the Site and for properties located within 100 m of the PDA
- Review of the Environmental Risk Information Services report
- Review of previous environmental reports (if available)
- Site visit and interview with the landowner (if requested) to obtain information relevant to the Site and adjacent properties

The potential sites for the Project were evaluated via desktop assessment and field studies to determine effects and benefits to the following environmental components:

- Historic and current land use
- Hydrogeology
- Fish and fish habitat
- Vegetation and wetlands
- Wildlife
- Historical resources

Based on the results of the environmental site assessments completed at the potential Project locations, it was determined that the NE and SE-10-056-22-W4M (the PDA) had fewer anticipated interactions with forested land, wetlands, fish and fish habitat, and wildlife and wildlife habitat because it is already largely disturbed. No other locations are being considered at this time.

12.1.2 Cooling

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 or aerial 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. This warm water is typically routed to a cooling tower, where the evaporation of most of the water cools the rest, which is then recirculated back through the project.

For the power generation facility, air cooling has been chosen to provide the principal cooling method. Air cooling offers significant environmental advantages relative to water-based cooling:

- No need for large-scale water supply infrastructure (e.g., a river water intake facility, with its attendant impacts on the riparian environment, principally during construction)
- No need for a large make-up water storage pond to check that adequate quantities of surplus water are available in the event of limitations on withdrawing river water

12.2 Alternatives to the Project

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

Part C: Location Information

13 Geographic Information

13.1 Geographical Setting of the Project

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 AIES 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.

The Project is situated in the Alberta IH-DIZ in Sturgeon County. This parcel of land is in the “I5 – Heavy Industrial District” according to the Sturgeon County Land Use Bylaw (1385/17) (Sturgeon County 2017). The IH-DIZ provides opportunity for major industrial uses as identified within the Sturgeon County Municipal Development Plan and the Alberta’s Industrial Heartland Area Structure Plan (Sturgeon County 2007). The location is a privately owned greenfield site that is currently leased out for agricultural purposes.

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.

13.2 Site Maps

The Project location is showed in Figure 1.1. The conceptual project layout is shown in Figure 1.2.

13.3 Legal Land Description

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) and both the pipeline and powerline ancillary infrastructure will start at this geographical location.

13.4 Proximity To Communities and Residence

The Project is located within the IH-DIZ area zoned for heavy industrial development. Individual residents are permitted to live within the industrial heartland if the residential/dwelling unit existed prior to the implementation of the IH-DIZ bylaw. New residential developments are restricted.

There are three known residential dwellings within 2 km of the Project. 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 Project and the Town of Gibbons is located approximately 8.5 km to the west of the Project.

13.5 Proximity To Indigenous Communities

The Project is located in Treaty 6 territory and is proximal to Indigenous groups and organizations, as shown in Figure 4.1. Table 13.1 summarizes the distances of First Nations Reserves and Métis settlements that are within 150 km of the Project.

Table 13.1 First Nation Reserves and Métis Settlements Distance from the Project

Name	Distance from the Project (km)
ALEXANDER 134	45
ALEXANDER 134B	120
ALEXIS 133	82
BEAVER LAKE 131	120
BLUE QUILLS FIRST NATION INDIAN RESERVE	119
BUCK LAKE 133C	141
ENOCH CREE NATION NO. 135	47
ENOCH CREE NATION NO. 135A	81
ERMINESKIN 138	100
LOUIS BULL 138B	104
MONTANA 139	119
PIGEON LAKE 138A	102
SADDLE LAKE 125	86
SAMSON 137	109
SAMSON 137A	119
WABAMUN 133A	81
WABAMUN 133B	87
WHITE FISH LAKE 128	101

As the Project is on private land and within an area that is currently zoned for industrial use, the use of this area for Indigenous harvesting or other use would not be considered appropriate. Furthermore, there is no land within the PDA that is used for the practice of Indigenous rights or harvesting.

13.6 Proximity To Federal Land

The Project will be located on privately owned land and will not overlap any federally owned lands (see Figure 4.1).

The nearest federally owned lands to the Project includes 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).

14 Physical Environment

14.1 Project Environmental Setting

The Project is located in the North Saskatchewan Region in central Alberta (the region). The region is bordered by Saskatchewan to the east, British Columbia to the west. There are three regional planning areas adjacent to the Project, the Upper Athabasca and Lower Athabasca to the North and the Red Deer planning region to the south. Banff National Park is located along the west boundary of the region and the City of Edmonton is located centrally within the region. The region has a wide variety of landscapes ranging from the Rocky Mountains and foothills in the west, to prairie parkland and grasslands to the east and the boreal forest to the north. Key activities in the region include agriculture, oil and gas development, recreation and tourism (GOA 2014).

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 with aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) and numerous small wetlands. The Southern Dry Mixedwood Natural Subregion lies between the Central Parkland and Central Mixedwood Natural Subregions. The Southern Dry Mixedwood Natural 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). Terrain is gently undulating glacial till or lacustrine plains. Some hummocky uplands also occur. Aspen forests are prevalent on upland landscapes with mixed understories of rose (*Rosa* sp.), low-bush cranberry (*Viburnum edule*), beaked hazelnut (*Corylus cornuta*) and Canada buffaloberry (*Shepherdia canadensis*). Wetlands occupy approximately 15% of the subregion, and include 10% organic wetlands, and 5% shallow peat or mineral wetlands (Natural Regions Committee 2006). Land-use in the region includes forestry, oil and gas activity, grazing and cultivation (Natural Regions Committee 2006). Soils in the subregion include gray and dark gray luvisols on uplands, and gleysols and organic soils in wetlands (Natural Regions Committee 2006).

14.1.1 Air Quality

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

The Project is located within the Heartland Air Monitoring Partnership (HAMP), formerly known as Fort Air Partnership (FAP), a multi-stakeholder, not-for-profit organization responsible for collecting and sharing air quality monitoring data information on ambient air quality. The HAMP includes ten continuous ambient air quality monitoring stations and one portable monitoring station that measure a wide range of substances near both industrial facilities and communities. The 2023 HAMP annual report (FAP 2024a) indicates that most of the time, air quality was good, or “low risk” at all the monitoring stations. Bruderheim 1, Elk Island, Fort Saskatchewan, Gibbons, Lamont, and Redwater continuous monitoring stations and Portable station in Thornhild County collected a total of 57,241 hours of Air Quality Health

Index (AQHI) measurements in 2023. Aside from the wildfires and a few inversion events, the AQHI values in 2023 had 83.4% of the recorded hours occurring in the low-risk range, with approximately 12.8% in moderate range, and 3.8% in high range (FAP 2024a). The high risk AQHI values were almost entirely due to unprecedented levels of fine particulate matter (including particulate matter 2.5 microns or less in diameter [$PM_{2.5}$]) due to wildfire smoke (FAP 2024b).

Representative baseline ambient air quality concentrations for the air quality study area were determined based on analysis of regional ambient air quality monitoring data. The Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022b) prescribes the representative monitoring stations in the IH-DIZ for the determination of baseline concentrations. The Supplementary Guideline prescribes Gibbons station for nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and $PM_{2.5}$, Fort Saskatchewan for carbon monoxide (CO), and Ross Creek station for NH_3.

The ambient monitoring data for the most recent three years (2022-2024) with complete data record (at least 75% complete) was analyzed to determine representative baseline concentrations following the calculation methodology in the Air Quality Model Guideline (AEP 2021). For $PM_{2.5}$, the data from 2021 to 2023 was used after removing any event linked to wildfire smoke. The 2024 $PM_{2.5}$ data was not used because it was influenced by wildfire smoke and information to remove the wildfire events from monitoring data is not yet available. The representative baseline concentrations used for the assessment of the Project emissions are summarized in Table 14.1 and compared to the Alberta Ambient Air Quality Objectives/Guidelines (AAAQO/G) (AEPA 2024). The baseline NO_2 concentrations are less than 22% of the AAAQO. The baseline SO_2 concentrations are less than 4% of the AAAQO. The 1-hour average baseline $PM_{2.5}$ concentration is 21.5% of the AAAQG and the 24-hour $PM_{2.5}$ baseline concentration is 57.7% of the AAAQO. The baseline CO concentrations are less than 7% of the AAAQO. The 1-hour average baseline NH_3 concentration is 0.9% of the AAAQO.

Table 14.1 Baseline Air Quality Concentrations

Substance	Averaging Period	Ambient Background Concentration [a] (µg/m³)	AAAQO (µg/m³)	Comparison of Background to AAAQO (%)
NO_2	1-hour	31.9	300	10.6
	Annual	9.8	45	21.8
SO_2	1-hour	3.2	450	0.7
	24-hour	2.8	125	2.2
	30-day	1.2	30	4.0
	Annual	0.8	20	4.0
$PM_{2.5}$ [b]	1-hour	17.2	80	21.5
	24-hour	16.7	29	57.7
CO	1-hour	380	15000	2.5
	8-hour	379	6000	6.3

Substance	Averaging Period	Ambient Background Concentration [a] (µg/m^3)	AAAQO (µg/m^3)	Comparison of Background to AAAQO (%)
NH_3	1-hour	13.1	1400	0.9

Notes:

[a] For 1-hour averaging period, the 90th percentile value from the cumulative frequency distribution of the background monitoring data, averaged over 3 years, is applied (AEP 2021). For 24-hour, 30-day and annual averaging periods, the maximum values from the cumulative frequency distribution of the reduced hourly background monitoring data set (after removing top hourly values above the 90th percentile values and averaged over 3 years) are applied (AEP 2021).

[b] Identified transboundary flows/exceptional events (TF/EE) influences removed from data; Based on 2021-2023 data; 2024 data not included in the analysis because its influenced by TF/EE events and data to exclude those events from the analysis is not available yet.

14.1.2 Acoustic Environment

As required in AUC Rule 007, a noise impact assessment (NIA) in accordance with the AUC Rule 012: Noise Control (AUC 2024b) will be completed for the Project operation noise effects. The NIA will quantify the Baseline Case, Project Case, and Application Case sound levels. The Project Case sound levels represent the noise effect from the Project only. The Application Case cumulative sound level is determined by combining the noise effects from the Baseline Case and Project Case. The Application Case results at the most impacted receptors (or residential dwellings) are compared to the Permissible Sound Level (PSL) noise thresholds prescribed in AUC Rule 012.

Environmental noise effects of the regulated facilities within the IH-DIZ need to comply with the AER Directive 038: Noise Control (AER 2024), and AUC Rule 012 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 to comply with the AUC and AER noise regulations. AUC, AER, and Northeast Capital Industrial Association have worked together to set PSLs specifically for noise receptors within the IH-DIZ.

The Regional Noise Model (RNM), developed following the RNMP, is an online tool showing the baseline noise contours in the IH-DIZ region. The baseline noise contours provide an easy-to-use method to identify baseline noise within the IH-DIZ area and the Project noise effects to predict the cumulative noise effects. The latest baseline noise contour results were published in the Northeast Capital Industrial Association Regional Noise Management Plan Report, in May 2024. The RNMP report provides detailed baseline acoustic environment with modeling results and environmental noise monitoring survey in the IH-DIZ area covering the 2022 and 2023 calendar years.

In accordance with AUC Rule 012, the ambient sound level (ASL), without any energy-related facilities, is deemed as 35 A-weighted decibels (dBA) in nighttime and 45 dBA in daytime around the PDA. Baseline Case sound levels for the Project at the receptors will be determined by combining the ASL and the RNM results. Once the Project obtains access to the RNM, noise contour data from the existing energy-related

facilities will be accessed and the Baseline Case sound levels will be incorporated into the Application Case assessment. Detailed assessment for the noise effects of the Project will be included in the NIA report and DPD.

14.1.3 Geology and Hydrogeology

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 groundwater yield capacity at the Project site is mapped at approximately 7 – 33 m^3/day (1 – 5 imperial gallons per minute [igpm]) (Stein 1976) and is assumed to be within interbedded shale and sandstone units.

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 m; however, certain areas reported clay, clay and rocks, sand, and/or sand and rocks to a maximum depth of 48.8 m (AEPA 2025a). In the area of the Project, there are thinner more permeable unconsolidated sediments (eolian) on top of bedrock compared to other areas. Stein (1976) notes that in the area of PDA, the significant portion covered by eolian deposits results in an area of increased infiltration and net recharge to bedrock aquifers, specifically the Belly River Formation.

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 2025a). Groundwater is predominately found in the sandstone bedrock; however, localized perched aquifers in the unconsolidated deposits is likely to be present.

Further exploration of the possibility of using groundwater from below the base of groundwater protection (i.e., above 4,000 parts per million [ppm] total dissolved solids [TDS] [AER 2025]) was done by using the Base of Groundwater Protection Query Tool (AER 2025). The base of groundwater protection is estimated at approximately 370 m across the area. This is an estimate of the depth in which the groundwater would have greater than 4,000 ppm TDS.

Deeper aquifers may be able to provide sufficient groundwater production. However, there is insufficient information to determine if this is a feasible water supply alternative given the groundwater geochemistry from deep regional aquifer units. The first available bedrock aquifer that may yield sufficient groundwater is sandstone within the lower Wapati Formation, approximately 200 m below grade, with an average expected yield of up to 655 m^3/day (100 igpm). Underlying the Wapati Formation is the Lea Park Formation, a thick shale package that acts as an aquitard with low yield potential (<7 m^3/day [1 igpm]) (Stein 1976).

14.1.4 Surface Water and Fish and Fish Habitat

The Project is within the North Saskatchewan Above Beaverhill sub-watershed of the North Saskatchewan River watershed. The surface water and fish and fish habitat study area is the PDA (on NE-10-56-22 W4M and the northern portion of SE-10-56-22 W4M) with a 100 m buffer applied. There are no waterbodies crossed within the surface water and fish and fish habitat study area.

Potential watercourses within a 5 km radius of the Project were identified using the Alberta Environment and Protected Area (EPA) Fish and Wildlife Internet Mapping Tool (FWIMT) hydrology datasets (GOA 2025b, 2025c). The North Saskatchewan River (EPA 2025; FWMIS [Fisheries and Wildlife Management Information System] Waterbody ID 2162) is located approximately 4 km west and the Sturgeon River (EPA 2025; FWMIS Waterbody ID 2236) is located approximately 4.4 km southwest at their closest points. The North Saskatchewan River and Sturgeon River are identified within the St. Paul Management Area *Water Act* Code of Practice (COP) Map. Near the Project location, the North Saskatchewan River is a Class C waterbody with a restricted activity period (RAP) from April 16 to July 31 (Alberta Environment [AENV] 2012) and the Sturgeon River is a Class C waterbody with a RAP from April 16 to June 30 (AENV 2012).

Seven unnamed tributaries to the North Saskatchewan River are located within 5 km of the Project. Four unnamed tributaries to the North Saskatchewan River are located approximately 0.6 km (EPA 2025; FWMIS Waterbody ID 21989), 1.1 km (EPA 2025; FWMIS Waterbody ID 41456), 2.5 km (EPA 2025; FWMIS Waterbody ID 41382) and 2.9 km (EPA 2025; FWMIS Waterbody ID 21990) to the north at their closest points. Two of the unnamed tributaries to the North Saskatchewan River are located approximately 1.55 km (EPA 2025; FWMIS Waterbody ID 41524) and 1.8 km (EPA 2025; FWMIS Waterbody ID 25433) to the southeast of the Project at their closest points. One unnamed tributary to the North Saskatchewan River is located approximately 3.3 km (EPA 2025; FWMIS Waterbody ID 41751) to the south of the Project at its closest point. As per the COP, these watercourses share the same RAP as the North Saskatchewan River (i.e., April 16 to July 31).

Three unnamed tributaries to the Sturgeon River are located within 5 km of the Project. The three unnamed tributaries to the Sturgeon River are located approximately 3.4 km (EPA 2025; FWMIS Waterbody ID 41689), 3.8 km (EPA 2025; FWMIS Waterbody ID 41659) and 3.9 km (EPA 2025; FWMIS Waterbody ID 41699) to the southwest of the Project at their closest points. As per the COP, these watercourses share the same RAP as the Sturgeon River (i.e., April 16 to June 30).

A review of historical fish capture data was conducted for each watercourse and was compiled using AEPA's online FWIMT (AEPA 2025b) and Fisheries and Oceans Canada's (DFO) aquatic species at risk map (DFO 2025). The FWIMT query area included a reach 10 km upstream and 10 km downstream within the North Saskatchewan River adjacent to the PDA, 10 km upstream within the Sturgeon River from the confluence with the North Saskatchewan River, the 7 tributaries to the North Saskatchewan River within 5 km of the Project, and the 3 tributaries to the Sturgeon River within 5 km of the Project. Table 14.2 provides the status of each fish species identified in the FWIMT search area. Lake sturgeon (*Acipenser fulvescens*) is listed as threatened under the Alberta *Wildlife Act* (GOA 1997) and the Alberta Endangered Species Conservation Committee (AESCC; GOA 2024b), and at risk under the General Status of Alberta Wild Species (AEPA 2022a). Several fish species of management concern have been observed in watercourses within a 10 km radius of the Project (EPA 2025; Table 14.2). No FWMIS records exist for the unnamed tributaries to the North Saskatchewan River draining the areas to the north and east of the Project (EPA 2025). 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 (DFO 2025). It is not expected that aquatic species at risk occur within the FWIMT query area.

Table 14.2 Historical Fish Presence Documented Near the Project

Species Information			Legislated Protection		Scientific Review or Recommendation		
Family[a]	**Common Name[a]**	**Scientific Name[a]**	**SARA (Federal)[b]**	**Wildlife Act[c] (Provincial)**	**COSEWIC (Federal)[d]**	**AESCC[e] (Provincial)**	**General Status (Provincial)[f]**
Acipenseridae	lake sturgeon	*Acipenser fulvescens*	No status	Threatened	Non-active	Threatened	At risk
Catostomidae	longnose sucker	*Catostomus catostomus*	No status	Not listed	Not assessed	Not assessed	Secure
	shorthead redhorse	*Moxostoma macrolepidotum*	No status	Not listed	Not assessed	Not assessed	Secure
	white sucker	*Catostomus commersonii*	No status	Not listed	Not assessed	Not assessed	Secure
	quillback	*Carpiodes cyprinus*	No status	Not listed	Not assessed	Not assessed	Undetermined
	silver redhorse	*Moxostoma anisurum*	No status	Not listed	Not assessed	Not assessed	Undetermined
Cottidae	spoonhead sculpin	*Cottus ricei*	No status	Not listed	Not at risk	Not assessed	May be at risk
Esocidae	northern pike	*Esox lucius*	No status	Not listed	Not assessed	Not assessed	Secure
Gadidae	burbot	*Lota lota*	No status	Not listed	Not assessed	Not assessed	Secure
Gasterosteidae	brook stickleback	*Culaea inconstans*	No status	Not listed	Not assessed	Not assessed	Secure
Hiodontidae	goldeye	*Hiodon alosoides*	No status	Not listed	Not assessed	Not assessed	Secure
	mooneye	*Hiodon tergisus*	No status	Not listed	Not assessed	Not assessed	Secure
Leuciscidae	emerald shiner	*Notropis atherinoides*	No status	Not listed	Not assessed	Not assessed	Secure
	fathead minnow	*Pimephales promelas*	No status	Not listed	Not assessed	Not assessed	Secure
	longnose dace	*Rhinichthys cataractae*	No status	Not listed	Not assessed	Not assessed	Secure
	river shiner	*Alburnops blennius*	No status	Not listed	Not assessed	Not assessed	Undetermined
	spottail shiner	*Hudsonius hudsonius*	No status	Not listed	Not assessed	Not assessed	Secure
	northern redbelly dace	*Chrosomus eos*	No status	Not listed	Not assessed	Not assessed	Sensitive
	Northern pearl dace	*Margariscus nachtriebi*	No status	Not listed	Not assessed	Not assessed	Undetermined

Species Information			Legislated Protection		Scientific Review or Recommendation		
Family[a]	**Common Name[a]**	**Scientific Name[a]**	**SARA (Federal)[b]**	**Wildlife Act[c] (Provincial)**	**COSEWIC (Federal)[d]**	**AESCC[e] (Provincial)**	**General Status (Provincial)[f]**
Percidae	walleye	*Sander vitreus*	No status	Not listed	Not assessed	Not assessed	Secure
	sauger	*Sander canadensis*	No status	Not listed	Not assessed	Not assessed	Sensitive
Percopsidae	trout-perch	*Percopsis omiscomaycus*	No status	Not listed	Not assessed	Not assessed	Secure
Salmonidae	mountain whitefish	*Prosopium williamsoni*	No status	Not listed	Not assessed	Not assessed	Secure

Notes:

[a] Common and Scientific Names of Fishes from the United States, Canada, and Mexico (Page et al. 2023)

[b] *Species at Risk Act* (GOC 2025)

[c] Alberta *Wildlife Act* – Wildlife Regulation (GOA 1997)

[d] COSEWIC (GOC 2025); considered a species of management concern if assessed as threatened

[e] AESCC (GOA 202b); recommendations by the Alberta Endangered Species Conservation Committee and its Scientific Subcommittee

[f] General Status of Alberta Wild Species (AEPA 2022a); considered a species of management concern for this assessment if designated as: sensitive, may be at risk, or at risk

The North Saskatchewan Above Beaverhill sub-watershed is within the “yellow zone” for whirling disease/aquatic invasive species decontamination risk (AEPA 2020). The “yellow zone” represents high to moderate risk waters for the introduction and/or spread of whirling disease due to the presence of susceptible species and high use of and access to water (AEPA 2020).

14.1.5 Soils

The Project is located on previously cultivated fields within Soil Correlation Area 10 (Thick Black/ Dark Gray-Gray Soil Zone of Central and East-Central Alberta), where soils are predominantly Chernozems and Luvisols (Alberta Soil Information Centre 2016).

The study area for soils for the Initial Project Description includes the PDA (on NE-10-56-22 W4M and the northern portion of SE-10-56-22 W4M) with a 100 m buffer applied. To support the Pre-Disturbance Site Assessment and inform the upcoming soil field survey and clubroot testing in 2025, the following existing data was used to conduct a desktop analysis within the Soils Study Area:

- Soil Series Information for Reclamation Planning in Alberta. Volume 1 (Pedocan 1993)
- Cumulative Clubroot Infestations (2003-2015) Map (GOA 2015)
- Alberta Soil Names File (Generation 4) User’s Handbook (Alberta Soil Information Centre 2016)
- Alberta Soil Information Viewer: Soil Inventory Database (AGRASID; GOA 2025d)

A query of the provincially mapped soil series and associated baseline soil characteristics within the soils study area was conducted using the Alberta Soil Information Viewer (GOA 2025d). Results of the query are summarized in Table 14.3. The topography within the soils study area is undulating with slope gradients ranging from 1% to 4%. Moreover, the soils study area contains two (2) map units HBM10/U1h and HBPO1/U1h that encompass five (5) different soil series including Hobbema, Angus Ridge, Camrose, Ponoka, and Miscellaneous Gleysol. In general, the Hobbema and the Ponoka soil series are most prevalent within the soils study area. Within the HBM10/U1h map unit, the extent of the Hobbema soil series is anticipated to occupy 60% of soils and the Angus Ridge, Camrose, Ponoka, and Miscellaneous Gleysol soil series each occupy 10% of soils. Within the HBPO1/U1h map unit, the extent of Hobbema and the Ponoka soil series each occupy 50% of soils.

The Hobbema and Angus Ridge soil series both consist of well drained Eluviated Black Chernozems developed on medium textured till parent materials and typically have good to fair reclamation suitability ratings and low wind and water erosion risks (Table 14.3). The Ponoka soil series consists of well drained Eluviated Black Chernozems developed on medium textured lacustrine or fluvial parent materials and typically has good to fair reclamation suitability ratings and low wind and water erosion risks. The Camrose soil series consists of well drained Black Solodized Solonetz developed on medium textured till parent materials and has special soil management considerations due to elevated salinity and sodicity levels. The Camrose soil series typically has poor to unsuitable reclamation suitability ratings with limitations of elevated sodium adsorption ratios and electrical conductivity levels (Pedocan 1993). The Miscellaneous Gleysol soil series consists of poorly drained Orthic Humic Gleysols developed on undifferentiated parent materials in low relief areas.

Table 14.3 Provincially Mapped Soil Series within the Soils Study Area

Map Unit[a]	Soil Series[a]	Soil Subgroup[a]	Drainage[a]	Parent Material[a,b]	Surficial Soil Texture[a]	Topography[a]	Slope Gradient (%)[a]	Soil Series Extent (%)[a]	Reclamation Suitability (Topsoil/Subsoil)[b]	Wind Erosion Risk[b]	Water Erosion Risk[b,c]
HBM10 /U1h	Hobbema	Eluviated Black Chernozem	Well	Till	L, SiL	Undulating	4	60	G/F	Low	Low
	Angus Ridge	Eluviated Black Chernozem	Well	Till	L	Undulating	4	10	F/F	Low	Low
	Camrose	Black Solodized Solonetz	Well	Till	L	Undulating	4	10	P/U	Low	Low
	Ponoka	Eluviated Black Chernozem	Well	Fluvial or Lacustrine	L	Undulating	3	10	F/F	Low	Low
	Miscellaneous Gleysol	Orthic Humic Gleysol	Poor	Undifferentiated	L	Undulating	1	10	-	-	-
HBPO1 /U1h	Hobbema	Eluviated Black Chernozem	Well	Till	L, SiL	Undulating	4	50	G/F	Low	Low
	Ponoka	Eluviated Black Chernozem	Well	Fluvial or Lacustrine	L	Undulating	4	50	F/F	Low	Low

Notes

[a] Source: GOA 2025d

[b] Source: Pedocan 1993

[c] Wind erosion risk ratings for slope gradients less than 5% in Pedocan 1993

"-" = not rated

Reclamation Suitability Ratings

"G" = Good

"F" = Fair

"P" = Poor

"U" = Unsuitable

Textures

"L" = Loam

"SiL" = Silt Loam

No known datasets show historical confirmed clubroot locations, however, within the Sturgeon County where the Project is located, more than 50 fields were recorded to have clubroot infestations from 2003 to 2015 (GOA 2015).

Overall, results from the desktop assessment of baseline soils within the soils study area anticipate the occurrence of two (2) map units and five (5) soil series, and indicate historical occurrences of clubroot within Sturgeon County. Moreover, while desktop results show that soils are expected to generally have good to fair reclamation suitability within the soils study area, inclusions of Solonetzic soils with special soil management considerations due to elevated salinity and sodicity are also expected. These desktop results will be verified with a soil field survey and clubroot testing in 2025.

14.1.6 Vegetation and Wetlands

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

The vegetation and wetlands study area is the PDA (NE-10-56-22 W4M and the northern portion of SE-10-56-22 W4M) with a 100 m buffer applied. Stantec completed vegetation and wetland field surveys June 30 to July 3, 2023 within the PDA and surveys consisted of wetland classification and delineation surveys and a spring species of conservation concern (SOCC) plant survey. Incidental weed observations were documented, but a comprehensive weed survey of the PDA was not completed.

Vegetation SOCC are those listed under *Species at Risk Act* (SARA) or tracked by Alberta Conservation Information Management System (ACIMS) (2024, 2022a, 2022b) which includes species listed by the Alberta *Wildlife Act* (AWA). There are several SOCC known to occur in the Dry Mixedwood NSR (ACIMS 2022c, with tracking data for vascular plants from ACIMS 2024) but none within one km of the vegetation and wetlands study area. No plant species at risk listed by SARA or the AWA have a distribution that overlaps the vegetation and wetlands study area (GOC 2025; GOA 2025a). Additionally, no known historical occurrences of plant SOCC which are not species at risk overlap the vegetation and wetlands study area (ACIMS 2022). The closest SOCC occurrence is cat-tongue liverwort (*Conocephalum salebrosum*) (ranked S2S4 [ACIMS 2022], and not AWA or SARA listed) located more than four km southeast of the vegetation and wetlands study area. The closest vascular plant occurrence is long-leaved bluets (*Houstonia longifolia*) (ranked S3 [ACIMS 2024], and is not AWA or SARA listed), located more than five km northwest of the vegetation and wetlands study area. The PDA is mostly cultivated, and the ongoing yearly disturbance is not suitable for many of the possible SOCC from the NSR. No SOCC were found during the field surveys.

Weeds documented during the field surveys included six noxious weeds; common burdock (*Arctium minus*), creeping thistle (*Cirsium arvens*e), field bindweed (*Convolvulus arvensis*), perennial sow-thistle (*Sonchus arvensis*), white cockle (*Silene latifoli*a), and scentless chamomile (*Tripleurospermum inodorum*).

There were several wetlands 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*). Two dugouts were also present in the vegetation and wetlands study area, one of which is in the PDA.

14.1.7 Wildlife and Wildlife Habitat

The PDA is mainly cultivated land 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 is in Migratory Bird Nesting Zone B4, which has a regional nesting period from mid-April to late-August (ECCC 2025). The Project is not located in any provincial key wildlife ranges or zones, parks or protected areas (AEPA 2025b). There are no Important Bird Areas in the vicinity of the Project (Birds Canada 2025).

Landcover in the PDA that provides suitable nesting and foraging habitat for migratory birds comprises trees areas, including windrows and former farm residence, shrubs, modified grassland, and graminoid marshes. The majority of the PDA is cultivated and seeded to crop, which can provide foraging habitat for some migratory birds. There are numerous species of migratory bird with ranges overlapping the PDA; however, based on habitat availability, species likely to breed in the PDA are only those that will utilize small, anthropogenically influenced patches of habitat. Common species likely to occur in the PDA may include red-winged blackbird (*Agelaius phoeniceus*), American crow (*Corvus brachyrhynchos*), house wren (*Troglodytes aedon*), clay-colored sparrow (*Spizella pallida*), vesper sparrow (*Pooecetes gramineus*), Savannah sparrow (*Passerculus sandwichensis*), and song sparrow (*Melospiza melodia*).

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 SARA), including 12 birds, 2 amphibians, 3 mammals, and 2 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. Species at risk with ranges overlapping the PDA are shown in Table 14.4.

A query of the FWMIS database yielded records for wildlife species occurring within a 2 km radius of the Project site. American badger is the only SARA-listed species for which occurrences have been recorded in this area (AEPA 2025b).

Wildlife fieldwork was completed in June and July 2023 and consisted of a wildlife habitat reconnaissance, auditory breeding bird point count survey, waterbird usage survey, and diurnal amphibian visual encounter surveys within a wildlife study area composed of the PDA and a 1000 m buffer. The survey methods followed Alberta's *Sensitive Species Inventory Guidelines* (AEPA 2013), where applicable.

Table 14.4 Species at Risk with Ranges Overlapping the Project Area

Common Name	Scientific Name	SARA Status [1]	COSEWIC Status [1]	Habitat Association
Birds				
Baird's sparrow	*Ammodramus bairdii*	Special Concern (Schedule 1)	Special Concern	Prairie with sparse shrubs, moderate grass heights, hay and croplands
Bank swallow	*Riparia riparia*	Threatened (Schedule 1)	Threatened	Vertical banks, including stockpiles of soil
Barn swallow	*Hirundo rustica*	Threatened (Schedule 1)	Special Concern	Barns, houses, sheds near grasslands, agricultural fields, wetlands
Bobolink	*Dolichonyx oryzivorus*	Threatened (Schedule 1)	Special Concern	Hayfields, pasture
Canada warbler	*Cardellina canadensis*	Threatened (Schedule 1)	Special Concern	Wet, shrubby mixed-wood forest
Common nighthawk	*Chordeiles minor*	Special Concern (Schedule 1)	Special Concern	Open and partially open habitats, including disturbed areas
Horned grebe (western population)	*Podiceps auritus*	Special Concern (Schedule 1)	Non-active	Semi-permanent or permanent ponds or marshes with emerging vegetation
Olive-sided flycatcher	*Contopus cooperi*	Special Concern (Schedule 1)	Special Concern	Edges of mixed forest alongside open areas
Rusty blackbird	*Euphagus carolinus*	Special Concern (Schedule 1)	Special Concern	Coniferous forest adjacent to wetlands
Short-eared owl	*Asio flammeus*	Special Concern (Schedule 1)	Threatened	Open habitat, including grassland and wetland
Western grebe	*Aechmophorus occidentalis*	Special Concern (Schedule 1)	Special Concern	Marshes with emergent vegetation, stable water levels, and open areas
Yellow rail	*Coturnicops noveboracensis*	Special Concern (Schedule 1)	Special Concern	Marshes with sedges and little to no standing water
Amphibians				
Western tiger salamander (prairie/boreal population)	*Ambystoma mavortium*	Special Concern (Schedule 1)	Special Concern	Grassland, parkland with semi-permanent or permanent waterbodies
Western toad (calling population)	*Anaxyrus boreas*	Special Concern (Schedule 1)	Special Concern	Open water wetlands and waterbodies with riparian areas and nearby upland

Common Name	Scientific Name	SARA Status [1]	COSEWIC Status [1]	Habitat Association
Mammals				
American badger (taxus subspecies)*	*Taxidea taxus taxus*	Special Concern (Schedule 1)	Special Concern	Grassland, shrubland, agricultural areas
Little brown myotis	*Myotis lucifugus*	Endangered (Schedule 1)	Endangered	Maternity colonies in buildings or large-diameter trees near waterways, forest edges
Northern myotis	*Myotis septentrionalis*	Endangered (Schedule 1)	Endangered	Maternity colonies in large-diameter trees near waterways, forest edges and gaps
Arthropods				
Gypsy cuckoo bumble bee	*Bombus bohemicus*	Endangered (Schedule 1)	Endangered	Open meadows, mixed farmland, boreal forest
Monarch	*Danaus Plexippus*	Endangered (Schedule 1)	Endangered	Open and disturbed habitat, such as roadsides, fields, wetlands, prairies, open forest with milkweed

Note:

* Species occurrence recorded within 2 km of the PDA (AEPA 2025b).

Sources:

[1] GOC 2025

Based on habitat availability in the wildlife study area, it is unlikely that most species at risk with ranges overlapping the Project would occur within the PDA. 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 the wildlife study area.

Seventeen migratory bird species and one raptor species were observed during the 2023 breeding bird point count survey, the most common being savannah sparrow and song sparrow. The diurnal amphibian visual encounter survey identified two species of amphibian within the wildlife study area: wood frog (*Lithobates sylvaticus*) and boreal chorus frog (*Pseudacris maculata*). The waterbird usage survey did not identify any important waterbodies for waterbird staging and migration within the wildlife study area. No species at risk were identified in the wildlife study area during the 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.

14.1.8 Historical Resources

The Spring 2025 version of the Listing of Historic Resources (the Listing) (AACSW 2025) was reviewed relative to the Project. The Listing includes an Historic Resource Value (HRV) for the southeast corner of the Project (HRV 5a), indicating that there is perceived high archaeological site potential in this portion of the Project site. This HRV overlaps the Project by less than an 8 m by 8 m space. The rest of the PDA is not included within the current Listing.

In addition, the Historic Resources Management Branch online database was accessed to review the Project. Three previous Historic Resources Impact Assessments have been completed on the PDA (Alberta Geospatial Portal 2025). The largest was for Petro-Canada Oil Sands Inc. Sturgeon Upgrader Project (Leyden 2007). The other two were for ATCO (Pipelines and Electric Ltd.) for two high pressure gas pipelines (Alberta Geospatial Portal 2025).

One archaeological site (FkPh-50, a historic period artifact scatter), was recorded within the PDA; however, no further work is required for the PDA, and 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 (Leyden 2007). This was due to the highly disturbed nature of the lands due to farming activities. In addition, the archaeologist surmised that lands closer to the North Saskatchewan River would be characterized as having higher archaeological potential (Leyden 2007).

15 Health, Social and Economics of Sturgeon County and the City of Edmonton

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 northeast of Edmonton. Several localities and hamlets are located within Sturgeon 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 (Table 15.1). 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 percent of Edmonton's population identified as Indigenous while 8.4% of the population identified as Indigenous in Sturgeon County (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).

Table 15.1 Population Characteristics, 2021

Location	Total Population			Indigenous Population			Percent of Population of Aboriginal Identity (2021)
	Population			Population			
	2016	2021	% change	2016	2021	% change	
Edmonton	933,088	1,010,899	8.3	50,280	58,165	15.7	5.8
Sturgeon County	20,495	20,061	-2.1	1,655	1,640	-0.9	8.4
Fort Saskatchewan	24,169	27,088	12.1	1,420	1,915	34.9	7.2
Gibbons	3,159	3,218	1.9	280	295	5.4	9.3
Alberta	4,067,175	4,262,635	4.8	258,640	284,470	10.0	6.8

Source: 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%) (Table 15.2) (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%.

Table 15.2 Labour Characteristics, 2021

Location	Population (aged 15 years and older)	Labour Force	Participation Rate (%)	Employed	Unemployed	Unemployment Rate (%)
Gibbons	2,470	1,705	69.0	1,500	200	11.7
Fort Saskatchewan	20,945	14,845	70.9	13,245	1,595	10.7
Edmonton	812,610	554,040	68.2	483,855	70,185	12.7
Sturgeon County	15,805	10,750	68.0	9,860	895	8.3
Alberta	3,375,135	2,295,380	68.0	2,030,730	264,650	11.5

Source: Statistics Canada 2023

The median age of Edmonton residents was 36.8 years in 2021. The Town of Gibbons had a median age of 37.6 in 2021 and Fort Saskatchewan's median age was 36.0. In Sturgeon County, the median age of the population was higher at 41.2 years (Statistics Canada 2023).

In 2020, Edmonton's median total household income was $90,000 while Sturgeon County's was $124,000. The median total household income for residents of Gibbons and Fort Saskatchewan were $108,000 and $113,000, respectively (Statistics Canada 2023).

In Edmonton, the greatest proportion of the total labour force worked in sales and service occupations (24.8%) and trades, transport and equipment operators and related occupations (18.5%) in 2021. Members of the Sturgeon County labour force were mainly employed in trades, transport and equipment operators and related occupations (24.5%) and in business, finance and administration occupations (16.3%) (Statistics Canada 2023).

In 2021, the Edmonton economic region, which includes Sturgeon County and Fort Saskatchewan, had 609,810 private dwellings of which 92.8% were occupied by permanent residents (Statistics Canada 2023). The residential vacancy rate in Edmonton fell from 4.1% in 2022 to 2.3% in 2023 (GOA 2024a). According to the Edmonton Affordable Housing Needs Assessment (City of Edmonton 2023), there are 46,155 households in Edmonton experiencing core housing need and more of these households are renters than homeowners.

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 (AHS 2016). Between 2019-2020 and 2023-2024, the number of physicians in the Edmonton Zone increased from 2,839 to 3,057 (AHS 2024).

Community health indicators for the local geographic area are presented in Table 15.3.

Table 15.3 Health Indicators, 2019/2020

Indicators	Edmonton Zone			Alberta		
	Total	Male	Female	Total	Male	Female
General Health						
Perceived health (very good or excellent)	63.2	64.4	62.0	63.7	63.6	63.8
Has a regular healthcare provider	82.2	75.4	89.1	85.2	80.2	90.2
Mental Health						
Perceived mental health (very good or excellent)	66.6	70.2	63.0	66.1	68.4	63.7
Sense of community belonging (very strong or somewhat strong)	66.8	65.3	68.4	69.6	68.3	70.9
Perceived life stress (Population aged 12 and over who reported perceiving that most days in their life were quite a bit or extremely stressful)	20.6	18.4	22.8	20.1	18.4	21.9
Life satisfaction (satisfied or very satisfied)	93.1	93.0	93.1	93.0	92.9	93.2
Rates of Chronic Disease						
Arthritis (15 years and over)	19.7	14.5	25.0	19.2	16.1	22.4
Diabetes	6.6	6.7	6.4	6.7	8.4	5.1
Asthma	19.7	8.7	9.5	8.7	7.3	10.0
Chronic obstructive pulmonary disease (35 years and over)	4.0	3.2	4.9	3.5	3.1	3.9
High blood pressure	15.8	16.5	15.1	16.4	18.5	14.3
Rates of Substance Abuse and Healthy Living Indicators						
Current smoker, daily or occasional	15.0	16.6	13.4	14.8	17.1	12.5
Heavy drinking	17.4	19.4	15.5	18.8	22.8	14.8
Physical activity, 150 minutes per week, adult (18 years and over)	57.8	62.0	53.5	60.0	64.4	55.6

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

With respect to general health indicators, residents of the province and the Edmonton Zone reported similar levels of perceived mental health in 2020, with just over 63% stating that they perceive their health to be very good or excellent. In both geographies, more females than males had a regular healthcare provider (Statistics Canada 2022). Approximately 66% of residents of the Edmonton Zone and the province reported having very good or excellent mental health. Higher rates of males than females in both geographies reported having very good or excellent mental health. Approximately 20% of Edmonton Zone and provincial residents reported to experience quite a bit or extremely high levels of stress with females in both areas experiencing slightly more stress than males (Statistics Canada 2022).

Residents of the Edmonton Zone and the province were more likely to have arthritis and/or asthma than other chronic diseases listed in Table 15.3. Females were more likely to have these diseases than males in both geographies while males reported higher rates of high blood pressure. Residents of the Edmonton Zone and the province reported similar rates of smoking and drinking, with males partaking in these activities at higher rates than females (Statistics Canada 2022).

Part D: Federal, Provincial, Territorial, Indigenous and Municipal Involvement and Effects

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 Jurisdictions That Have Powers, Duties or Functions in Relation to an Assessment of the Project's Environmental Effects

18.1 Federal Regulatory Requirements

In addition to the current process under the *Impact Assessment Act*, the Project will be subject to the following acts:

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

Other federal acts that could be relevant to the Project include the following acts:

- *Canadian Navigable Water Act*
    - Current design does not involve works in or crossing a navigable water, therefore no authorization is required
- *Aeronautics Act*
    - The Project is planned in proximity to a few aerodromes:
        - Warren Thomas (Josephburg) Aerodrome within approximately 12 km
        - Villeneuve Airport within approximately 47 km
        - Edmonton (City) Heliport within approximately 44 km
        - Edmonton International Airport within approximately 60 km

However, based on current design, the *Aeronautics Act* will not apply to the Project because there are no structures on site that are tall enough to require lighting for aviation safety and the closest aerodromes are more than 6 km from the PDA.

18.1.1 *Fisheries Act*

Based on the limited potential for the Project to interact with fish bearing streams and the proposed use of municipal water for water needs, it is unlikely the *Fisheries Act* will be applicable.

18.1.2 *Migratory Birds Convention Act*

Section 6.1 of the Migratory Birds Regulations states that without a permit, the disturbance, destruction, or removal of a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or possession of a migratory bird, carcass, skin, nest, or egg of a migratory bird are prohibited. From April through August, migratory birds are nesting and fledging; any construction activities during this period would necessitate the consideration of the Guidelines to Avoid Harm to Migratory Birds (GOC 2023). Construction activities will take into account the restricted activity periods for migratory birds and either avoid or mitigate appropriately with the Act.

18.1.3 *Species at Risk Act*

The SARA provides regulatory protection and includes prohibitions against the killing, harming, harassment, capture, or taking of species listed as extirpated, endangered, or threatened. The damage and destruction of residence are prohibited under SARA.

Project activities are not anticipated to result in any violations to SARA.

18.2 Provincial Regulatory Requirements

Provincial regulatory requirements that may affect the Project are those associated with the following acts:

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

18.2.1 *Hydro and Electric Energy Act*

Pursuant to Section 11 of the *Hydro and Electric Energy Act*, the AUC Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, Hydro Developments and Gas Utility Pipelines (AUC 2024a) applies to applications for construction, alteration, operation and connection of power plants, hydro developments, substations, transmission lines, battery storage facilities and industrial systems designations, as well as the construction, operation and modification of gas utility pipelines or pipeline installations. The Project will require approval under AUC Rule 007 for construction and operation of a power generation facility and transmission line.

AltaLink L.P., the Transmission Facility Owner, will be responsible for preparing and submitting the AUC application for the transmission line.

18.2.2 *Electric Utilities Act*

The AESO manages and operates the provincial power grid as the Independent System Operator designate pursuant to Part 2 of the *Electric Utilities Act.* The purpose of the Act is to provide a competitive power pool so that an efficient electricity market based on fair and open competition can develop and to proved for rules in which the market is supplied. An application to the AESO will be required to connect and provide power to Alberta through the AIES.

18.2.3 *Environmental Protection and Enhancement Act*

The Project is listed under the EPEA Physical Activities Regulations as a "power plant", where a plant that has a rated peak production output of greater than one megawatt under peak load. However, the Project is not listed in the Environmental Assessment (Mandatory and Exempted Activities) Regulation (Alberta Regulation 111/1993). Therefore, the Project will require an approval issued under EPEA, but an environmental impact assessment is not mandatory under the Act. An environmental impact assessment can be requested by the Director at their discretion.

The Project will require an approval under Schedule 1 Division 2, Part 9 of EPEA for the construction, operation, or reclamation of a power generation facility. In addition, the Project will require the submission of a Topsoil Conservation and Use Plan including a Pre-Disturbance Site Assessment. An application to AEPA under the Guide to Content for Industrial Approval Applications (AENV 2014), Part 1: New Plants and Facilities, will be required.

18.2.4 *Water Act*

The *Water Act* supports and promotes the conservation and management of water through the use and allocation of water in Alberta. Diversion licence applications pursuant to the Water (Ministerial) Regulation requires a licence for the diversion of water, surface and/or groundwater. The Project will be using a municipal water source to meet their water needs. As such, water diversion license for withdrawal from the North Saskatchewan River, or any other waterbody, is not anticipated.

Development affecting wetlands and water bodies is regulated under the *Water Act*. Effects on wetlands associated with long-term disturbance of topography or hydrology of wetlands, such as those caused by the construction of above-ground facilities or permanent access roads, require approvals under the *Water Act* from the authorizing regulator before construction via a *Water Act* Application supported by a Wetland Assessment Impact Report. Effects on wetlands associated with short-term/temporary disturbances caused by the construction of a pipeline or temporary access roads shall follow the standard operating practices as outlined in the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body, and the Code of Practice for Watercourse Crossings. A notification form supported by a Wetland Assessment and Impact Form (where applicable) shall be submitted to AEPA 14 days prior to starting work.

18.2.5 *Historical Resources Act*

Heritage resources are regulated under the Alberta *Historical Resources Act* (*HRA*) and administered by the Historic Resources Management Branch of AACSW. The need for, and scope of, heritage resource assessments is determined by AACSW based on their guidelines and requirements. AACSW independently evaluates the scientific value of heritage resource sites and determines the need for mitigation including avoidance measures. As this proposed Project requires approval by the AUC, an Historic Resources application must be completed and submitted via the Online Permitting and Clearance system (AACSW 2023a). Project approval under the *HRA* is required from AACSW prior to construction (AACSW 2023a).

18.2.6 *Pipeline Act*

The *Pipeline Act* establishes a regulatory regime for the construction and operation of pipelines in Alberta. are required for the installation of pipelines in Alberta. An approval under AER Directive 056 – Energy Development Applications and Schedules, would also be required for the pipeline; however, it is expected this would be the responsibility of Pembina Pipeline Corporation.

18.2.7 *Public Lands Act*

The *Public Lands Act* (PLA) governs development on Crown land. Crown land refers to land owned by the provincial government and is also referred to as Public land. Under Section 3 of the PLA, the Crown claims title to all naturally occurring bodies of water, rivers, streams, watercourses, and lakes. Semi-permanent and permanent wetlands and watercourses may require a water boundaries review to determine if they are "reasonably permanent" and claimed by the Crown. If wetlands or watercourses are found within the boundaries of the planned construction, restricted activities, setbacks, and/or design plan revisions may be required depending on the characteristics of the waterbody.

The PDA is located on private land and, therefore, with the exception of any Crown-claimable wetlands, the *Public Lands Act* is likely not applicable.

18.3 Municipal Regulatory Requirements

Sturgeon County (2022) has a 2022-2025 Strategic Plan that includes five community outcomes that guide strategic decision-making for the evolution of the community and identifies key strategic priorities. The County also includes development plans incorporated into bylaws, as provided in Table 18.1.

Table 18.1 Municipal Regulatory Requirements

Bylaw or Policy	Description
Sturgeon County Municipal Development Plan Bylaw #1313/13 (Sturgeon County 2014)	The Plan 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)	The purpose of this Bylaw is to regulate 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)	The purpose of Alberta's Industrial Heartland Area Structure Plan is to review and update ASP Bylaw No. 900/00 in accordance with Sturgeon County's Terms of Reference.

18.4 Regional Plans and Management Frameworks

18.4.1 Industrial Heartland Designated Industrial Zone Directive

The Project is located within the Alberta IH-DIZ in Sturgeon County. The Alberta Industrial Heartland Association is a non-profit municipal collaboration promoting responsible development in the Industrial Heartland. The Association is comprised of five municipal partners including: City of Fort Saskatchewan, Lamont County, Strathcona County, Sturgeon County, and the City of Edmonton.

A regulatory framework has been established for this area that outlines key principles and policies and provides guidance on processes and protocols, with the goal of attracting new investment and creating good jobs for Albertans. In addition, the Industrial Heartland Designated Industrial Zone Directive was developed as a tool to regulate industries within the IH-DIZ with the goal to improve regulatory consistency and achieve environmental outcomes. A variety of operational policies and guidelines were developed for operators located within the IH-DIZ, related primarily to air, water and soil storage. These include:

- Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications and Resolving Model Predicted Exceedances of Alberta Ambient Air Quality Objectives and Guidelines (AAAQO/G – For implementation of the Industrial Heartland Designated Industrial Zone (AEP 2022b)
- Air Emissions Requirement Policy for the IH-DIZ (AEP 2022c)
- The Water Management Framework for the Industrial Heartland and Capital Region (AEPA 2016)
- Industrial Heartland Designated Industrial Zone Water Quality Management Program (AEPA 2022b)
- Guideline for Industrial Operators in the Heartland Designated Industrial Zone for Conservation, OffSite Storage and Off-Site Use of Topsoil (GOA 2022)

18.4.2 North Saskatchewan Region

The Project is in the North Saskatchewan Region. Development of the North Saskatchewan Regional Plan, as part of the Alberta Land Use Framework, was initiated in 2014. To date, the terms of reference have been developed, a Regional Advisory Council has been appointed, who have provided recommendations for the plan, and the first phase of public consultation has been completed.

A RNMP has been developed for the Alberta IH-DIZ by the Northeast Capital Industrial Association (NCIA 2022) that provides a regional approach to managing noise from industrial facilities. It includes a regional noise model on-line tool where site noise models can be developed and combined with the regional model to show the environmental noise in the region. This plan allows member companies to adopt best management practices for noise management.

Part E: Potential Effects of the Project

19 Potential Effects

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

19.1.1 Fish and Fish Habitat

Details are provided in Section 19.2.4; however, the Project is not expected to have effects on fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act*.

19.1.2 Aquatic Species at Risk

The Project is not expected to have effects on aquatic species as defined in subsection 2(1) of the *Species at Risk Act.*

19.1.3 Migratory Birds

Details are provided in Section 19.2.7; however, 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.

19.2.1 Air Quality

19.2.1.1 Effect Pathways

Construction

Air emissions during the construction phase result from construction equipment exhaust and from fugitive dust associated with the construction activities. Table 19.1 summarizes the potential effects and pathways that may occur, and which are typical of power generation facility construction projects.

Table 19.1 Potential Construction Phase Effects on Air Quality

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
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	✓

Exhaust emissions from construction equipment include, but are not limited to, excavators, rock movers, graders, packers, dozers, haul dump trucks, zoom-boom, concrete trucks, and tunnel casing pullers. This equipment primarily consumes diesel fuel, and the products of combustion are emitted to the atmosphere. Diesel-powered equipment also includes generators, light plants and in-line heaters. The combustion emissions are primarily nitrogen (N_2), CO_2, and water vapour with trace amounts of contaminants such as NO_X, SO_2, CO, particulate matter (PM) including diesel combustion particulate matter, and volatile organic compounds (VOCs). These gases and particles are common by-products of fossil fuel combustion.

Fugitive dust emissions from surface disturbance activities result in particle emissions of various size ranges (e.g., $PM_{2.5}$, articulate matter 10 microns or less in diameter (PM_{10}), and total suspended particulate [TSP] matter) that can also be deposited to off-site ground surfaces (i.e., dustfall). $PM_{2.5}$ refers to respirable particulate matter that has an aerodynamic diameter less than 2.5 micrometres (µm) and TSP includes larger particles, nominally up to 30 µm in diameter. The larger dust particles are predominantly removed near the disturbance area by gravitational settling and is the main contributor to dustfall. TSP, PM_{10} and $PM_{2.5}$ emissions can be carried off-site by wind; the smaller PM_{10} and $PM_{2.5}$ fraction tends to be transported further downwind than the TSP.

Construction planning for the Project is not yet underway and estimates of the number, type or size of construction vehicles and other equipment or the quantities of material that will be moved are not available to allow for quantification of construction emissions. Construction emissions will be limited to the construction phase and are typically less than operational emissions for most pollutants.

Operation

Emission of air contaminants during operation of the Project will result from the combustion of natural gas in the proposed CCGT. The combustion pollutant emissions are primarily NO_X, SO_2, $PM_{2.5}$, and CO. Operational emissions are minimized by using clean burning natural gas and advanced pollution control such as selective catalytic reduction (SCR). During Project operation, emissions of metals or polyaromatic hydrocarbons (PAHs) are expected to be negligible. There will also be emissions of air contaminants generated from minor Project emission sources such as emergency diesel generators, emergency diesel fire pumps, and fuel gas heaters. Table 19.2 summarizes the potential effects and pathways that may occur, and which are typical of facility operations.

Emissions from the Project are conservatively estimated based upon a non-carbon capture equipped combined cycle gas plant and that, the carbon capture plant, if built and operating, may result in additional emissions of trace levels of VOC associated with the carbon capture solvent as well as may have some positive impact on some other pollutant emissions (incidental removal).

Table 19.2 Potential Operation Phase Effects on Air Quality

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
Change in air quality	• Air contaminant emissions from hydrocarbon-fueled equipment (e.g., combustion turbine) during operation	✓

The maximum estimated emissions from the Project were calculated based upon the type and size of the gas turbine for the Project. The maximum potential air emissions associated with the Project, based on 8,760 hours per year of operation are summarized in Table 19.3. While expected to be very small, as detailed engineering and equipment selection has not yet started, it is not possible to provide quantification of trace level VOC emissions. Emissions of PAHs and metals are expected to be negligible.

Table 19.3 Project Operations Phase Air Contaminant Emissions

Pollutant	**Potential Annual Emissions (tonne/year)**
NO_X	1633
SO_2	13.3
CO	1030
NH_3	666
$PM_{2.5}$	596

Decommissioning and Abandonment

Atmospheric emissions during the decommissioning and abandonment phase would be similar or less than those associated with construction.

19.2.1.2 Mitigation

Construction

Mitigation measures that may be implemented during construction to address potential effects on air quality are listed in Table 19.4 and are typical to a power generation facility construction project.

The magnitude of the construction emissions is directly related to the construction activity intensity. Project-related transportation and construction of Project components involve the movement of the most material, and hence these two activities are expected to generate the largest emissions during the construction phase.

Smaller emissions associated with other activities, such as site preparation may occur. While construction could occur over a nominal two to three-year period, the air substance emission rates would not be constant and would vary greatly during this period. Due to the short-term nature and small magnitude of the Project construction emissions, it is unlikely that the increase in emissions due to the Project will cause a substantial change to ambient air quality in the area.

Table 19.4 Potential Construction Phase Mitigation Measures for Air Quality

Potential Effects and Pathways		**Mitigation Measures**
Potential Effect	**Effect Pathways**	
Change in air quality	• Air contaminant emissions from equipment and vehicles burning hydrocarbon fuel during construction activities	• Vehicles and equipment will be required to meet emission control standards including the On-Road Vehicle and Engine Emission Regulations and the Off-road Compression-Ignition (Mobile and Stationary) and Large Spark-Ignition Engine Emission Regulations. • The concentration of sulphur in diesel fuel shall not exceed 15 milligrams per kilogram to comply with Sulphur in Diesel Fuel Regulations. • Construction vehicle idling times will be reduced to the extent possible to reduce emissions, as a best management practice.
	• Dust generated during soil stripping and grading and through vehicle and equipment movement on the construction footprint and unpaved roads	• 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.

Operation

Mitigation measures that may be implemented during operation to address potential effects on air quality are listed in Table 19.5 and are typical to CCGT facility operations projects. As engineering progresses, further mitigation measures, including facility-specific mitigation measures, may be developed. The NOx emissions from the Project will meet the provincial (AENV 2005) and federal guidelines (ECCC 2017).

Table 19.5 Potential Operations Phase Mitigation Measures for Air Quality

Potential Effects and Pathways		**Mitigation Measures**
Potential Effect	**Effect Pathways**	
Change in air quality	• Air contaminant emissions from hydrocarbon-fueled equipment (e.g., combustion turbine) during operation	• Meeting ambient air quality objectives, and industry standard best practices for operational emissions • 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 such as SCR or a similar control technology to limit NO_X emissions to acceptable regulated limits. SCR systems result in a small amount of NH_3 emitted (ammonia slip). • Project NO_X emissions will be less than 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 (AENV 2005).

Decommissioning and Abandonment

Mitigation measures similar to those implemented during construction would be employed during decommissioning and/or abandonment activities to reduce potential effects on air quality.

19.2.2 Acoustic Environment

19.2.2.1 Effect Pathways

Construction

Noise emissions during the construction phase will arise from construction equipment and vehicles. Table 19.6 summarizes the potential effects and pathways that may occur, and which are typical of a power generation facility construction project.

Table 19.6 Potential Construction Phase Effects on the Acoustic Environment

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
Change in existing sound levels that may cause noise annoyance	Noise emissions from stationery and mobile equipment used to construct the power generation facility	✓

The power generation facility construction activities may include site clearing, surface preparation, earth excavation and moving, access road construction, foundation concrete work, and installation of major equipment. Mobile noise emitting equipment includes construction related equipment, including but not limited to, excavators, rock movers, graders, packers, dozers, haul dump trucks, zoom-boom, and concrete trucks, and employee personal vehicles. Stationery noise emitting equipment includes generators and light plants. The earth moving and concrete work activities are short-term and seasonal. Noise from the construction phase of the Project site is expected to be similar to that of other construction activities and traffic around the Project.

Provincial and local noise regulations, bylaws or ordinances that prescribe qualitative or nuisance-based approach for construction noise. During different construction phases, site preparation activities are expected to produce the highest noise emission levels. Vehicular traffic will increase marginally during workers' arrival and departure on site during the daytime period.

Operation

Noise emission during the operation phase is mainly from the power generation equipment such as combine cycle gas turbine and generator units, combustion air inlet, gas turbine exhaust, ventilation openings, coolers, compressors, pumps, and transformers. Table 19.7 summarizes the potential effects and pathways that may occur, and which are typical of power generation facility operations.

Table 19.7 Potential Operations Phase Effects on the Acoustic Environment

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
Change in existing sound levels that may cause noise annoyance	Noise emissions from operation of the power generation facility	✓

As described in Section 14.1.2, a NIA will be completed for the Project operation noise effect. The NIA will evaluate the noise impacts from the Project and compare the cumulative sound levels with the PSLs to assess compliance with the requirements of the AUC's Rule 012. The PSLs are set forth specifically for receptors within the IH-DIZ area with consideration of AUC and AER noise regulations, and RNMP. Details of the methods and procedures of the NIA will be presented in the DPD.

19.2.2.2 Mitigation

Construction

Noise from construction activities can be reduced by mitigation measures such as administrative control and engineering design. Commonly used mitigation measures for construction activities that may be considered and implemented are listed in Table 19.8. A Construction Noise Management Plan can be considered to manage construction noise effects. The plan can provide guidance to manage construction activities schedule; implement mitigation measures to reduce noise emissions; establish communication protocol to address noise complaints; and conduct noise monitoring during construction, if necessary.

Table 19.8 Potential Construction Phase Mitigation Measures for Noise

Potential Effects and Pathways		Mitigation Measures
Potential Effect	**Effect Pathways**	
Change in existing sound levels; and may cause noise annoyance	• Noise emissions from stationary and mobile equipment used to construct the power generation facility	• Construction activities will be limited to the daytime period. • Check that noise abatement equipment on vehicles and machinery is 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. • Minimize simultaneous operation of heavy equipment where possible (e.g., jackhammer and vacuum excavator). • Reroute construction and truck traffic, when possible. • Residents near to high noise generating activities (e.g., pile driving) will be notified prior to construction. • A complaint response procedure will be implemented to address noise complaints should they arise.

Operation

The NIA will identify dominant noise contributors at the receptors. If required, noise mitigation measures will be recommended to reduce noise effects. Examples of mitigation measures that may be implemented during operation are listed in Table 19.9 and are typical to the operation of power generation projects. As design information become available, specific mitigation measures can be developed if required.

Table 19.9 Potential Operations Phase Mitigation Measures for Noise

Potential Effects and Pathways		Mitigation Measures
Potential Effect	**Effect Pathways**	
Change in existing sound levels; and may cause noise annoyance	• Noise emissions from operation of the power generation facility	• Enclosures may be used on dominant noise emission equipment to reduce noise emissions. • Procure equipment with low noise rating. • Incorporating noise attenuation measures on ACC during design. This may include, but is not limited to, reducing fan speed, using low-noise fan blades, and/or adding acoustic materials. • Incorporating noise attenuation measures on the gas turbine exhaust and air intake pathway equipment, building ventilation system which may include sound insulation and/or inline silencers, as required.

19.2.3 Geology and Hydrogeology

19.2.3.1 Effect Pathways

Construction

The Project is located in the North Saskatchewan River Watershed Alliance (GOA 2018). The Project is underlain by the Wapati and Belly River Formations (Stein 1976). Unconsolidated sediment thickness throughout the area includes clay, sandy clay, till, sand, clay and rocks, and sand and rocks. Groundwater in the PDA is mapped as relatively high and the potential for groundwater interaction during excavation from Project construction has the potential to occur.

During construction of the power generation facility, the Project has the potential to change groundwater quantity and quality as a result of potential drilling of extraction wells, excavation and potential dewatering activities, and from accidental spills in areas where groundwater is shallow. Table 19.10 summarizes the potential effects and pathways that may occur, and which are typical of power generation facility construction projects.

Table 19.10 Potential Construction Phase Effects on Groundwater

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
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 drilling of extraction wells or dewatering	✓
	• Disturbance of pre-existing contamination (if discovered)	✓
	• Accidental spills	✓

Operation

Table 19.11 summarizes the potential effects and pathways that may occur, and which are typical of facility operations.

Table 19.11 Potential Operation Phase Effects on Groundwater

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
Change in groundwater quality or quantity	• Alteration of shallow groundwater levels through water diversions	✓
	• Accidental spills	✓

The Project has the potential to change groundwater quantity and quality as a result of excavation and potential dewatering activities during construction and/or during water supply for the operation of the Project. Dewatering, during construction will be done in accordance with standard construction practices and mitigation measures to direct discharge water away from drainage courses, water bodies and wetlands. The amount of drawdown is expected to be low because of the limited depth of the excavation and the relatively short period of dewatering at a given location.

The Project has the potential to change groundwater quality in the vicinity of the PDA as a result of accidental spills during construction and/or operation in areas where groundwater is shallow (i.e., springs, water wells, wetlands). In the event of a spill, efforts to contain, remove and remediate any contaminant(s) causing environmental effects would be completed.

Liquid discharges from the Project will be primarily stormwater, directed to the stormwater pond. The stormwater will be collected in a pond located in the PDA. The pond will be constructed with a liner to prevent any leaching into groundwater. On rare occasions, contaminants from a spill may be washed into the stormwater pond through Project runoff. Such contaminants may include diesel, gasoline, or industrial oil. Should any spills occur, they will be dealt with according to the Project-specific spill response and reporting plan that will be developed prior to commencing operation of the Project.

Process water and surface water runoff, as described in Section 25.3, will not interact with groundwater during operations. Process water will be recycled to the extent possible in the operation of the Project and contained in a closed loop system. This will include tank(s) for disposal through injection into a deep disposal well or disposed of offsite in accordance with regulatory codes and standards.

19.2.3.2 Mitigation

Construction

Standard construction practices and best management plans will be implemented during dewatering are effective mitigation measures to limit disturbances to the local groundwater system. Mitigation measures that may be implemented during construction to address potential effects on groundwater are listed in Table 19.12 and are typical to power generation facility construction projects.

Mitigation measures that will be implemented during construction to address potential effects on groundwater are typical to construction projects that include excavation. Dewatering during construction if necessary, will be temporary and will follow best management practices for construction dewatering, as identified in the mitigation measures.

Following implementation of mitigation measures, Project construction is not anticipated to have effects on groundwater.

Table 19.12 Potential Construction Phase Mitigation Measures for Groundwater

Potential Effects and Pathways		Mitigation Measures
Potential Effect	**Effect Pathways**	
Change in groundwater quality or quantity	• Disturbance to soil and parent material above or below the water table may change physical hydraulic properties	• Monitor water levels in all open excavations. • Limit the amount of time that a trench 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.
	• Alteration of shallow groundwater levels or flow rates through dewatering	
	• Disturbance of pre-existing contamination (if discovered)	• In the event that contaminated or potentially contaminated soil or water is encountered, implement contamination management and contingency plans.
	• Accidental spills	• 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.

Operation

Mitigation measures during the operations phase include monitoring of the groundwater network both for potential contaminants related to operation of the Project and to limiting the groundwater withdrawal to the calculated rate for consumption. Once the hydrogeological investigation for the PDA is completed, the potential residual effects on groundwater quantity will be evaluated and included in the DPD.

Decommissioning and Abandonment

Mitigation measures similar to those implemented during construction would be employed during decommissioning and/or abandonment activities to reduce potential effects on groundwater due to dewatering and potential spills.

19.2.4 Surface Water and Fish and Fish Habitat

19.2.4.1 Effect Pathways

Construction

The Project is located approximately 4 km west of the North Saskatchewan River and 4.4 km southwest of the Sturgeon River. Ten unnamed tributaries to the North Saskatchewan River are the closest watercourses to the Project falling within a 5 km radius of the Project. As there are no watercourses in close proximity to the PDA and no work below the ordinary high-water mark, it is unlikely that construction of the Project will affect surface water, fish or fish habitat. Furthermore, there is no anticipated effect to aquatic species at risk within the PDA. Water for the Project will be provided from a municipal source and diversion of water from the North Saskatchewan River is not anticipated.

It is assumed that no new permanent or temporary vehicle/equipment crossings will be constructed across any potential waterbody that is crossed as a result of the Project. However, if required, temporary vehicle/equipment crossings will consist of clear-span bridges, or ice bridges and snow fill during frozen conditions.

Operation

Following completion of power generation facility, no new operations phase effects on surface water, fish, fish habitat and aquatic species at risk are anticipated**.** There are no anticipated effects to surface water, fish, fish habitat and aquatic species at risk based on water use for Project operations and with the planned power generation facility water supply.

Potential effects to surface water during operations is limited to water discharge from the operation of the power generation facility stormwater pond. Surface water currently flows over the site following existing swales and berms or infiltrates into the ground. During construction, the PDA will be recontoured and ditching, berms and swales will be used to direct surface water flows from runoff to the stormwater pond. 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 EPEA water quality guidelines, before being released. The release of stormwater will be designed to maintain existing drainage patterns so adjacent properties are not affected. Drainage from the stormwater pond is not anticipated to effect fish, fish habitat or aquatic species at risk.

Decommissioning and Abandonment

No effects on surface water, fish, fish habitat or aquatic species at risk would be anticipated as a result of decommissioning and abandonment activities.

19.2.4.2 Mitigation

Construction

No additional mitigation measures are required as no operations phase effects on surface water, fish and fish habitat are anticipated.

Operation

No additional mitigation measures are required as no operations phase effects on surface water, fish and fish habitat are anticipated.

Decommissioning and Abandonment

Mitigation measures similar to those implemented during construction would be employed during decommissioning and/or abandonment activities to reduce potential effects on surface water, fish and fish habitat.

19.2.5 Soils

19.2.5.1 Effect Pathways

The Project is located on previously cultivated fields within Soil Correlation Area 10 (Thick Black/ Dark Gray-Gray Soil Zone of Central and East-Central Alberta) (Alberta Soil Information Centre 2016). There are potential effects to soil quality and quantity during Project construction, operation, and decommissioning and abandonment phases.

Construction

During construction of the power generation facility, topsoil will be stripped in areas undergoing ground clearance, trenching, and grading. Topsoil stockpiles will be stored on site long-term until reclamation activities commence during the decommissioning and abandonment phase. Wind and water erosion of exposed soils may occur during soil stripping, prior to trench backfill, and exposed areas prior to vegetation establishment. Alteration of soil structure, tilth, and soil porosity due to compaction, rutting, or pulverization may occur during equipment and vehicle traffic, especially where there are wet soil conditions. Loss or alteration of topsoil might occur from admixing of soil horizons through over-stripping during soil salvage, storage, and trenching particularly where there are non-obvious colour changes between topsoil and subsoil. The alteration of terrain contours could change surface drainage leading to a change in soil moisture and an increase water erosion risk. Because the PDA is within a previously cultivated field, encountering existing contamination during disturbance is not likely, however, historical spills from vehicle or equipment sources are possible. Table 19.13 summarizes the potential effects and pathways that may occur, and which are typical of power generation facility construction projects.

Table 19.13 Potential Construction Phase Effects on Soils

Potential Effects and Pathways		Project Component
Potential Effect	**Effect Pathways**	**Power Generation Facility**
Change in soil quality or 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	✓

Operation

No new soil disturbance is anticipated to occur within the operation phase. However, exposed soils following the construction of the power generation facility are susceptible to soil volume loss through wind and water erosion. In addition to wind and water erosion, soil compaction, rutting, loss of soil structure, and accidental spills may occur from equipment or vehicle traffic during operation within the power generation facility. Alteration of soil structure, tilth, and soil porosity due to compaction, rutting, or pulverization may occur are particularly at risk where there are wet soil conditions. Traffic during operation may include equipment use associated with operation of the power generation facility. Table 19.14 summarizes the potential effects and pathways that may occur, and which are typical of power generation facility construction projects.

Table 19.14 Potential Operation Phase Effects on Soils

Potential Effects and Pathways		Project Component
Potential Effect	**Effect Pathways**	**Power Generation Facility**
Change in soil quality and quantity	• Soil volume loss through wind and water erosion in exposed soils following clearing, grading, and soil handling and during storage	✓
	• Compaction, rutting, or loss of soil structure during vehicle or equipment movement	✓
	• Soil contamination through accidental spills	✓

Decommissioning and Abandonment

During decommissioning and abandonment phases, project infrastructure is typically removed and discarded followed by re-grading, topsoil replacement, and seeding. Soil water erosion, wind erosion, compaction, rutting, admixing, and accidental spills could occur through soil handling and vehicle traffic during re-grading, topsoil replacement, and other potential reclamation activities. Table 19.15 provides the potential effects and pathways that may occur during decommissioning and/or abandonment of the Project.

Table 19.15 Potential Decommissioning and Abandonment Phase Effects on Soils

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways[1]**	**Power Generation Facility**
Change in soil quality and quantity	• Soil volume loss through wind and water erosion during re-grading and replacement of topsoil	✓
	• Compaction, rutting, or loss of soil structure during vehicle or equipment movement or hauling	✓
	• Loss or alteration of soil through admixing during re-grading, topsoil replacement and other soil handling activities	✓
	• Soil contamination through accidental spills	✓

Note:

[1] Effect pathways presented are under the assumption that soil disturbance will occur during infrastructure removal and topsoil replacement during the decommissioning and abandonment phase

19.2.5.2 Mitigation

Construction

Mitigation measures to be implemented as appropriate during construction to address potential effects on soil quality and quantity are listed in Table 19.16 and are typical for power generation facility construction projects. As Project planning progresses, further mitigation measures, including Project-specific mitigation measures for sensitive resources, will be developed.

Table 19.16 Potential Construction Phase Mitigation Measures for Soils

Potential Effects and Pathways		**Mitigation Measures**
Potential Effect	**Effect Pathways**	
Change in soil quality and quantity	• Soil volume loss through wind and water erosion during clearing, grading, and soil handling	• 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, including storing topsoil and subsoil separately and conducting alternative soil handling procedures in areas with problem soils. • A soil qualified environmental professional or designate acting under the direction of a qualified environmental professional will be onsite during construction to monitor, direct, and confirm salvage procedures in the Topsoil Conservation Management Plan in such a way that minimizes admixing of strongly contrasting qualities of soil profiles (e.g., suitable topsoil overlaying unsuitable saline-sodic subsoil commonly found in the Camrose soil series). • 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 (ESC) measures 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.
	• 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	

Operation

Mitigation measures like those implemented during construction will be employed operation activities to reduce potential temporary residual effects to soil quality and quantity. Additional mitigation measures to be implemented as appropriate during operation to address potential effects on soil quality and quantity are listed in Table 19.17 and are typical for power generation facility construction projects. As project planning progresses, further mitigation measures, including Project-specific mitigation measures for sensitive resources, will be developed.

Table 19.17 Potential Operation Phase Mitigation Measures for Soils

Potential Effects and Pathways		**Mitigation Measures**
Potential Effect	**Effect Pathways**	
Change in soil quality and quantity	• Soil volume loss through wind and water erosion in exposed soils following clearing, grading and soil handling and during storage	• Monitor disturbance areas and stockpiles during operation for weeds and signs of sedimentation and erosion and address appropriately where required following the ESC Plan.
	• Compaction, rutting, or loss of soil structure during vehicle or equipment movement	
	• Soil contamination through accidental spills	

Decommissioning and Abandonment

Mitigation measures like those implemented during construction will be employed during decommissioning and/or abandonment activities to reduce potential temporary residual effects to soil quality and quantity. Additional mitigation measures to be implemented as appropriate during operation to address potential effects on soil quality and quantity are listed in Table 19.18 and are typical for power generation facility construction projects. As project planning progresses, further mitigation measures, including site-specific mitigation measures for sensitive resources, will be developed.

Table 19.18 Potential Decommissioning and Abandonment Phase Mitigation Measures for Soils

Potential Effects and Pathways		Mitigation Measures
Potential Effect	**Effect Pathways**	
Change in soil quality and quantity	• Soil volume loss through wind and water erosion during re-grading and replacement of topsoil	• 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.
	• Compaction, rutting, or loss of soil structure during vehicle or equipment movement or hauling	
	• Loss or alteration of soil through admixing during re-grading, topsoil replacement and other soil handling activities	
	• Soil contamination through accidental spills	

19.2.6 Vegetation and Wetlands

19.2.6.1 Effect Pathways

Construction

The PDA is predominantly cultivated with some trees, modified grassland, tame pasture, and an abandoned farmyard, and is surrounded by cultivation and industrial areas. Wetlands and ephemeral waterbodies, and dugouts are present on the PDA and include graminoid marshes including ephemeral waterbodies, temporary graminoid marshes, seasonal graminoid marshes and a semi-permanent graminoid marsh.

During construction natural vegetation will be cleared, and wetlands will be disturbed. Areas within the power generation facility fenceline will be graded and wetlands within the fenceline will be assumed lost. Table 19.19 summarizes the potential effects and pathways that may occur.

Table 19.19 Potential Construction Phase Effects on Vegetation and Wetlands

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
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 weed from materials and vehicle and equipment movement	✓
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	✓

Operation

Following completion of the power generation facility construction, operations phase effects on native vegetation and wetlands are anticipated and will include vegetation management (i.e. weed control). Table 19.20 summarizes the potential effects and pathways that may occur. No additional further direct operation phase effects are anticipated for vegetation communities or wetlands from the power generation facility. However, introduction and spread of weeds will continue to be a potential effect pathway for the power generation facility an ancillary infrastructure.

Table 19.20 Potential Operation Phase Effects on Vegetation and Wetlands

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
Change in vegetation communities and species	• Indirect change in vegetation communities or species through introduction and spread of weed from vehicle and equipment movement	✓

Decommissioning and Abandonment

A net positive effect on vegetation and wetlands may occur if the power generation facility is removed, and the site is restored. There are no plans to reclaim removed wetland area; however new wetland area could potentially develop following decommissioning and abandonment if suitable topography and hydrology is present in the reclaimed landscape.

Table 19.21 summarizes the potential effects and pathways that may occur.

Table 19.21 Potential Decommissioning and Abandonment Phase Effects on Vegetation and Wetlands

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
Change in vegetation communities and species	• Increase in area of native vegetation communities or plant species of conservation concern (including species at risk) arising from reclamation	✓
	• Indirect change in vegetation communities or species through introduction and spread of weed from vehicle and equipment movement	✓
Change in wetlands	• Increase in wetland area arising from reclamation	✓
	• Change in hydrological regime, storage capacity or overall function (where tree growth is not suppressed)	✓

19.2.6.2 Mitigation

Construction

Mitigation measures to be implemented as appropriate during construction to address potential effects on native vegetation and wetlands are listed in Table 19.22 and are typical for power generation facility construction projects. As Project planning progresses, further mitigation measures, including Project-specific mitigation measures for sensitive resources, will be developed.

Table 19.22 Potential Construction Phase Mitigation Measures for Vegetation and Wetlands

Potential Effects and Pathways		**Mitigation Measures**
Potential Effect	**Effect Pathways**	
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	• Clearing or grubbing beyond the marked construction boundaries will not be allowed • Minimum surface disturbance techniques will be implemented where grading is not necessary • Temporarily disturbed areas will be reclaimed according to requirements of the land manager. This may include natural revegetation, and/or seeding • Exposed surfaces of permanently disturbed areas will be covered with mulch or a stone layer or revegetated after construction to reduce the proliferation of invasive species

Potential Effects and Pathways		Mitigation Measures
Potential Effect	**Effect Pathways**	
Change in vegetation communities and species (cont'd)	• Indirect change in vegetation communities or species through introduction and spread of weeds from materials and vehicle and equipment movement	• Equipment (e.g., vehicles, materials, swamp mats, etc.) 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 (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	• 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. • Only required grading will be done within wetland boundaries. Laydown area 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

Potential Effects and Pathways		Mitigation Measures
Potential Effect	**Effect Pathways**	
Change in wetlands (cont'd)	• Change in hydrological regime, storage capacity or overall function	• Vehicles and equipment will not be refueled or washed within 100 m of wetlands. • If ground conditions are encountered that create potential for rutting, admixing or compaction, a protective layer (e.g., frost packing, snow, ice, geotextile and fill, rig mats, swamp mats, or access mats) will be used · • Berms, cross ditches, sediment fencing and/or other appropriate measures will be used to prevent erosion and siltation into adjacent wetland areas • To facilitate restoration of cross right-of-way drainage, trench material will be replaced as soon as feasible and re-establish pre-construction contours within wetland boundaries • Where there are temporary access roads and pathways, cross drainage will be maintained to allow water to move from one side of the access road or pathway to the other.

Following implementation of mitigation measures, Project construction will have temporary to long-term residual adverse effects on native vegetation and wetlands where they are cleared or altered. Potential residual effects from construction are considered reversible to irreversible (wetland loss) following reclamation. However, permanent effects on wetlands will be compensated for in accordance with the Aberta Wetland Policy.

Operation

Mitigation measures similar to those implemented during construction will be employed during operation activities to reduce potential temporary residual effects on native vegetation and wetlands (i.e., to prevent rutting, and to prevent introduction and spread of weeds).

With implementation of mitigation measures, potential residual effects from operation are considered reversible.

Decommissioning and Abandonment

Mitigation measures similar to those implemented during construction will be employed during decommissioning and/or abandonment activities to reduce potential temporary residual effects on native vegetation and wetlands (i.e., to prevent introduction and spread of weeds and soil pathogens)

With implementation of mitigation measures, potential residual effects from decommissioning and abandonment are considered reversible following reclamation.

19.2.7 Wildlife and Wildlife Habitat, including Species at Risk and Migratory Birds

19.2.7.1 Effect Pathways

Construction

Construction of the power generation facility will require the clearing and disturbance of vegetation and wetlands. This may result in direct loss of wildlife habitat, changes in wildlife movement, and the potential for wildlife mortality. Table 19.23 summarizes the potential effects and effect pathways on wildlife and wildlife habitat (including for species at risk and migratory birds) that may occur.

Table 19.23 Potential Construction Phase Effects on Wildlife and Wildlife Habitat

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
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	✓
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)	✓
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	✓

Potential Project effects on migratory birds include the direct loss of nesting and foraging habitat through the removal of trees, shrubs, grassy areas, wetlands, and cultivated lands. Indirect effects on the suitability of migratory bird habitat may occur outside of the construction footprint through sensory disturbance from vehicles and equipment. The Project will not create physical barriers to the movement of migratory birds, but removal of habitat patches within the Project Area may affect local movements. Physical activities (e.g., vegetation removal and ground preparation) have the potential to increase mortality risk for migratory birds through interactions with Project vehicles and equipment, particularly

through inadvertent nest destruction during the migratory bird breeding period. Measures to mitigate potential effects from Project construction on migratory birds and other wildlife are presented in Table 19.25 and Table 19.26.

Operation

During operation of the Project, fewer potential effects on wildlife habitat are expected relative to the construction phase. However, ongoing sensory disturbance during operation may indirectly affect wildlife habitat availability and suitability. Table 19.24 summarizes the potential effects and pathways that may occur, which are typical of power generation facility operation.

Table 19.24 Potential Operations Phase Effects on Wildlife and Wildlife Habitat

Potential Effects and Pathways		**Project Component**
Potential Effect	**Effect Pathways**	**Power Generation Facility**
Change to habitat	• Indirect loss or alteration of habitat effectiveness through sensory disturbance during operations	✓
	• Indirect loss or alteration of habitat effectiveness through sensory disturbance during routine maintenance	✓
	• New habitat creation (e.g., structures available to raptors and corvids as perches or for nesting)	✓

Decommissioning and Abandonment

Typical decommissioning and/or abandonment activities of industrial facilities involve vehicle movement and ground disturbance, which might temporarily affect wildlife habitat within the ROW and could lead to increased wildlife mortality risk.

19.2.7.2 Mitigation

Construction

Mitigation measures that may be implemented during construction to address potential effects on wildlife and wildlife habitat (including for species at risk and migratory birds) are listed in Table 19.25 and are typical of power generation facility construction projects. As project planning progresses, further mitigation measures, including site-specific mitigation measures for sensitive resources, will be developed.

Table 19.25 Potential Construction Phase Mitigation Measures for Wildlife and Wildlife Habitat

Potential Effects and Pathways		**Mitigation Measures**
Potential Effect	**Effect Pathways**	
Change to habitat	• Direct loss or alteration of habitat from vegetation removal and ground disturbance	• 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 laydown area 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.
	• Indirect loss or alteration of habitat effectiveness through sensory disturbance	
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)	• Limit the amount of time that a trench is left open, or a barrier of trenches/open pits are left open
Change in mortality risk	• Ground disturbance and vegetation clearing resulting in physical destruction of key habitat features (e.g., nests, dens, hibernacula)	• Do not harass or feed wildlife. Personnel are prohibited from hunting, possessing, or feeding wildlife on the construction footprint. • 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.
	• 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	

Potential Effects and Pathways		Mitigation Measures
Potential Effect	**Effect Pathways**	
Change in mortality risk (cont'd)	• Wildlife-human conflict	*(continued from above)* • 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. In the case of trapped wildlife, contact the Environmental Inspector or designate. • 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.

Following implementation of mitigation measures, Project construction will cause long-term direct loss of potential wildlife habitat (i.e., treed patches, wetlands). However, indirect effects (i.e., sensory disturbance) on wildlife habitat, and effects on wildlife movement and mortality risk will be short term and reversible.

Operation

Mitigation measures that may be implemented during construction to address potential effects on wildlife and wildlife habitat (including for species at risk and migratory birds) are listed in Table 19.26 and are typical to power generation facility operations.

Table 19.26 Potential Operation Phase Mitigation Measures for Wildlife and Wildlife Habitat

Potential Effects and Pathways		**Mitigation Measures**
Potential Effect	**Effect Pathways**	
Changes to habitat	• Indirect loss or alternation of habitat effectiveness through sensory disturbance during operations	• 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.
	• Indirect loss or alteration of habitat effectiveness through sensory disturbance during routine maintenance	
	• New habitat creation (e.g., structures available to raptors and corvids as perches or for nesting)	

Following the implementation of mitigation measures, the residual effects on wildlife and wildlife habitat resulting from Project operation are expected to be low in magnitude, long-term, and reversible. The Project will meet applicable noise limits and require relatively few staff during operation, reducing the expected sensory disturbance and mortality risk to wildlife.

Decommissioning and Abandonment

Mitigation measures similar to those implemented during construction will be employed during decommissioning and/or abandonment activities to reduce potential effects on wildlife and wildlife habitat.

20 Summary of Federal Jurisdiction Considerations

The Project not expected to have effects on lands outside of Alberta or Canada. The Project is not located on federal lands, although there are Indigenous reserve lands in the vicinity of the Project (see Section 21). As such, no changes to the environment are expected to result on federal lands or in a province other than Alberta from the Project.

20.1 Marine Environment

No adverse effects to the marine environment are anticipated as a result of Project activities.

20.2 Interprovincial Waters

No adverse effects to interprovincial waters or boundary waters or international waters are anticipated as a result of Project activities.

21 Potential Effects on Extra-Provincial and Federal Lands

21.1 Extra-Provincial Lands

The Project is not expected to have effects on lands or interprovincial watercourses outside of Alberta or Canada.

The Project is not located on federal lands, although there are Indigenous reserve lands in the vicinity of the Project. Indigenous reserve lands within 50 km of the Project and their straight-line distances from the reserve boundary to the PDA are provided in Table 21.1. Indigenous reserve lands within 150 km are provided in Section 13.5.

Table 21.1 Distance from the Project Footprint to Nearby Indigenous Reserves

Indigenous Reserve	Distance to Project Footprint (km)
ALEXANDER 134	45
ENOCH CREE NATION NO. 135	47

Given the distances to most reserves, changes to federal lands by the Project are not anticipated. The Project is proximal to Alexander 134 and Enoch Cree Nation No. 135 reserve land and care will be taken to minimize potential changes to federal lands. Given the analysis of potential environmental effects provided in Section 19.2, the Project is not anticipated to adversely affect reserve land. Given the size of the Project and the localized effects on air quality, acoustic, 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 outside of Alberta.

21.2 Federal Lands

The Project will not to be carried out on federal land and is not a federal work or undertaking, as defined in subsection 3(1) of the Canadian Environmental Protection Act, 1999 and there are no anticipated effects on federal lands.

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

22.1 Indigenous Land Use

GECLP acknowledges that the PDA lies within an area where Indigenous groups may practice rights. As identified by the LAIRT, these groups are 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. It is anticipated that additional information regarding actual Indigenous land use related to the PDA 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 proposed PDA. The PDA lands are not included in the Alberta *Listing of Historic Resources* (Spring 2025 version).

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 several months to 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.

22.2 Historical Resources

Archaeological Site FkPh-50 will be impacted by the Project. Site FkPh-50 has been assigned an HRV 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 air 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 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.

23 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, 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. As identified by the LAIRT, these groups are 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 Metix Settlement, and Lac Ste. Anne Métis Community Association. GECLP will continue to consult with Indigenous groups and if potential effects are identified, GECLP will evaluate the need for mitigation at that time.

24 Greenhouse Gas Emissions Associated with the Project

During Project construction and operation, greenhouse gas (GHG) emissions expressed as CO_2e are associated with CO_2, methane (CH_4), and nitrous oxide (N_2O) emissions. The estimates of the number, type or size of construction equipment and quantities of material that will be moved are not available to allow for the quantification of construction emissions. Construction emissions will be limited to the construction phase and are typically less that operational emissions for most pollutants.

The CO_2 emissions are based upon manufacturer performance estimates conservatively assuming power output (1864 MW), and a 100% utilization factor (365 days of operation per year). Emissions of CH_4 and N_2O are based upon ECCC emission factors and conservatively assume no removal. The Global Warming Potential of CH_4 and N_2O are 28 and 265 based upon the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report. Project operation GHG emissions are summarized in Table 24.1. Net Project GHG emissions are calculated consistent with equation 1 of the Strategic Assessment of Climate Change.

The Government of Canada recently released the finalized CER December 17, 2024, which establishes an annual emissions limit requiring generating units to meet an annual emissions limit of 65 t/GWh CO2e. A unit may emit up to 35 t/GWh CO_2e above the 65 t/GWh CO_2e limit by remitting an equivalent amount of eligible offset credits. After 2050, the annual emissions limit reduces to zero, though facilities may utilize up to 42 t/GWh CO_2e in offset credits. As such, the Project will be monitoring advancements in CCS technologies and regulatory frameworks. The Project has been designed with flexibility to allow for the potential integration of carbon capture infrastructure in the future, including consideration of space allocation that could potentially support future CCS. GECLP will decide upon design and implementation of CCS at a future date based upon market conditions and to comply with regulatory requirements such as the CER.

Table 24.1 Estimated Maximum Project GHG Emissions Associated with Operation

Pollutant	GHG Emissions (kilotonne/year)	GHG Emission Intensity (kg/MWh)
CO_2	5646	346
CH_4	0.1	0.007
N_2O	0.1	0.006
CO_2e	5677	348

Notes:
CO2e calculated upon GWP as $CO_2e = CO_2 + 28 \times CH_4 + 265 \times N_2O$
kg/MWh – kilogram per megawatt hour

Construction and decommissioning and abandonment emissions will be limited to the construction and decommissioning and abandonment phases of the Project, and are expected to be less than Project operations, and occur for a limited duration. The construction phase of the Project is estimated to generate 50,701 tonnes of CO_2e emissions. Construction emissions are small compared to Project operations. GHG emissions during the decommissioning and abandonment phase would be similar or less than those associated with construction phase.

Canada's GHG emissions were 694 megatonnes (Mt) CO_2e in 2023 (the most recent year for which data are available for this report). This is a decrease of 6 Mt (0.9%) from 2022 emissions (700 Mt). Alberta's GHG emissions were 263 Mt CO_2e in 2023 and 265 Mt CO_2e in 2022, a decrease of 2 Mt (0.8%). Without CCS, maximum estimated Project operations GHG emissions are 0.8% and 2% to Canada's and Alberta's total annual GHG emission relative to 2023 totals. If the Project complies with the 2035 CER emission limit of 65 t/GWh, this decreases to 0.2% and 0.4%, respectively.

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.

The Strategic Assessment of Climate Change requires projects with a lifetime beyond 2050 to detail how the Project will achieve net-zero emissions by 2050. There are several potential pathways for the Project to achieve net-zero emissions by 2050, including the incorporation of a small amount of renewable (carbon-negative) natural gas or hydrogen into the Project fuel mix, by firing a small amount of biomass to generate steam to be used in the Project with the biomass exhaust gas processed in the CCGTs, or through offsets.

25 Waste and Emissions Generated by the Project

The Project construction and operations will result in air emissions (during construction, controlled operations and decommissioning and abandonment) noise emissions, surface runoff discharges, industrial wastewater disposal, and general operation waste generation.

25.1 Air

Air emissions generated during construction and operation of the power generation facility will result from several sources and activities (see Air Quality Effects of the Project, Section 19.2.1 and GHG emission from the Project in Section 24). Particulate matter is the term used to refer to solid particles and liquid droplets found in the air. Particulate matter is reported according to the diameter of the particle size; PM_{10} refers to coarse dust particles 2.5 to 10 microns in diameter and typically includes crushing and grinding operations and dust from vehicles on roads. $PM_{2.5}$ refers to fine particles 2.5 microns or less in diameter and can only be seen with an electron microscope. Fine particles are produced from all types of combustion and some industrial processes.

Fugitive dust and fine particulate emissions will be generated during construction from land clearing, site preparation, earth moving and material handling, and vehicles creating dust by traveling on land. In addition, off-road construction equipment (dozers, compressors, etc.) will release combustion by-products such as NO_x, CO, and VOCs when they operate by combusting fuel. Fugitive dust emissions ($PM/PM_{10}/PM_{2.5}$) will be higher during land clearing and site preparation and during active construction periods when there is increased vehicle traffic on the site from mobile equipment.

Emission of air contaminants during operation of the Project will result from the combustion of natural gas in the proposed CCGT. Project construction and operations will also emit greenhouse gases which are presented in Section 24.

25.2 Noise

Noise emissions during construction would be primarily related to the use of stationery and mobile equipment. During operations, noise will be generated from CCGT and generator units, combustion air inlet, gas turbine exhaust, ventilation openings, coolers, compressors, transformers, and other ancillary equipment. For details on effect pathways and mitigations, see Acoustic Environment Effects of the Project in Section 19.2.2.

The power generation facility will be designed to comply with applicable regulatory noise limits. If required, potential mitigation measures for the construction and operation phases will be considered, Section 19.2.2.2 above.

In the event of a noise complaint, the Project will follow the complaint resolution process outlined in AUC Rule 012 (AUC 2024b). This process includes conducting a noise complaint investigation in a timely manner and may include conducting a comprehensive sound survey during representative conditions.

A NIA for the Project will be presented in the DPD (if required).

25.3 Liquid Discharges

Liquid discharges from the Project will include process water, surface water runoff, dewatering during excavation, and domestic wastewater during construction and operations.

Optimization of process water generation and disposal will continue through project development and further described in the DPD (if required). GECLP intends to tie into the Sturgeon County sanitary sewer system that can accept the Project process wastewater, domestic wastewater and other wastewater produced during operation. If Sturgeon County determines that the sanitary sewer system cannot accept the Project's produced wastewater, it will be collected into above ground tanks and disposed of in accordance with regulatory codes and standards.

No new water diversion infrastructure is required.

25.4 Other Wastes

Other types of waste that are anticipated to be generated during the construction, operation, and decommissioning and abandonment phases are included below. This list is preliminary and will be further refined.

- Domestic waste and industrial garbage
- Recyclables (wood, paper, metal, plastics)
- Waste Oil
- Hazardous Waste (paint, solvents, batteries, fluorescent light bulbs, herbicides, etc.)
- Relief valve discharges
- Exhausted resin from condensate polisher

Wastes will be stored in appropriate receptacles or containment areas and will be removed from site for disposal at licensed disposal facilities.

26 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.

ACIMS (Alberta Conservation Information Management System). 2022a. List of elements in Alberta – mosses and liverworts. Available at: https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/download-data/. Accessed March 2025.

ACIMS. 2022b. List of elements in Alberta – lichens. Available at: https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/download-data/. Accessed March 2025.

ACIMS. 2022c. Element occurrences (Part 1:non-sensitive and Part 2: Sensitive, by township) [shapefiles]. Available at: https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/download-data/. Accessed March 2025.

ACIMS. 2024. List of elements in Alberta – vascular plants. Available at: https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/download-data/. Accessed March 2025.

AENV 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.

AENV 2012. Guide to Content for Industrial Approval Applications. June 2014. Available at: https://open.alberta.ca/publications/2478000 Accessed March 2025.

AENV 2014. Guide to Content for Industrial Approval Applications. June 2014. Available at: https://open.alberta.ca/dataset/11f878fc-5422-4890-9af3-9b54b6ec3ed6/resource/12be1987-4cc7-440e-8141-01a340fcba57/download/6239793-2014-environmental-protection-enhancement-act-guide-content.pdf

AEP (Alberta Environment and Parks). 2021. Air Quality Model Guideline. Alberta Environment and Parks, Air Policy Branch. September 2021.

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

AEP. 2022b. Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications and Resolving Model Predicted Exceedances of Alberta Ambient Air Quality Objectives and Guidelines. Alberta Environment and Parks. Available at: https://open.alberta.ca/publications/supplementary-guideline-for-preparation-air-quality-modelling-for-regulatory-applications. Accessed: March 2025.

AEP. 2022c. Air Emissions Requirement Policy for the Industrial Heartland Designated Industrial Zone. Available at: https://open.alberta.ca/dataset/de315275-56b6-4ce1-9529-110369a23e69/resource/8b8096a7-391c-4b0c-87c9-f298301cfeda/download/aep-industrial-heartland-diz-air-emissions-requirement-policy.pdf. Accessed: March 2025.

AEPA (Alberta Ministry of Environment and Protected Areas). 2013. Sensitive Species Inventory Guidelines. Updated March 1, 2013. Available at: https://open.alberta.ca/publications/sensitive-species-inventory-guidelines. Accessed March 2025.

AEPA (Alberta Environment and Protected Areas). 2016. The Water management Framework For The Industrial Heartland And Capital Region. Accessed March 2025 from: https://open.alberta.ca/dataset/afd35c34-c0c5-4d4b-b057-a613a71d1a34/resource/2f0ec79b-ec06-4d93-8572-f5d508a1a1a3/download/2008-watermanagementframeworkcapitalregion.pdf.

AEPA. 2020. Whirling disease decontamination risk zone map. Accessed March 2025 from: https://open.alberta.ca/dataset/c240b099-18cb-4037-91fa-4038de4012f7/resource/ac3a4e79-8fba-4a8c-ae91-7662134d7407/download/aep-whirling-disease-decontamination-risk-zone-map-2020-08.pdf.

AEPA. 2022a. Alberta Wild Species General Status Listing. Current to 2022. https://www.alberta.ca/lookup/wild-species-status-search.aspx. Accessed November 2024.

AEPA. 2022b. Industrial Heartland Designated Industrial Zone Water Quality Management Program. Accessed March 2025 from:https://open.alberta.ca/dataset/168c9aae-100f-410f-ac61-f1055ce40bf0/resource/e8d10426-8218-49bd-afe9-a7522f26f34c/download/aep-industrial-heartland-diz-water-quality-management-program.pdf

AEPA. 2024. Alberta Ambient Air Quality Objectives and Guidelines Summary. Alberta Environment and Parks, Air Policy Branch. July 2024.

AEPA. 2025a. Alberta Water Well Information Database. Available at: https://www.alberta.ca/alberta-water-well-information-database. Accessed March 2025.

AEPA. 2025b. Fish and Wildlife Internet Mapping Tool. Accessed March, 2025, from: https://geospatial.alberta.ca/FWIMT_Pub/Viewer/?TermsOfUseRequired=true&Viewer=FWIMT_Pub.

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

AER (Alberta Energy Regulator). 2025. AER. 2025. Base of Groundwater Protection Website and Data Portal. Available at: https://www.aer.ca/data-and-performance-reports/activity-and-data/list-and-activities/base-groundwater-protection-data. Accessed March 2025.

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

AHS. 2024. Annual Quick Facts 2023-24. Available at: chrome-

extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.albertahealthservices.ca/assets/about/publications/ahs-pub-quick-facts-annual.pdf

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.

Alberta Soil Information Centre. 2016. Alberta Soil Names File (Generation 4) User's Handbook. M.D. Bock (ed.). Agriculture and Agri-Food Canada. Available from: https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sag10989/$FILE/SNF_Gen_4_Report_01112017_Finalv2.pdf

AUC (Alberta Utilities Commission). 2024a. Alberta Utilities Commission Rule 007: Applications for Power Plants, Substations, Transmission LInes, Industrial System Designations, Hydro Developments and Gas Utility Pipelines. March 2024. Accessed online at https://www.auc.ab.ca/rule-007

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

Birds Canada. 2025. Important Bird Areas Canada Map Viewer. Accessed March 2025 from: https://www.ibacanada.ca/mapviewer.jsp?lang=en

City of Edmonton. 2023. Edmonton Affordable Housing Needs Assessment, August 2023. Available at: https://www.edmonton.ca/sites/default/files/public-files/assets/PDF/CoE-HousingNeedsAssessment2023.pdf

DFO. 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.

ECCC. 2025. General nesting periods of migratory birds: Nesting zones and periods. Accessed March 2025 from: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html

EPA. 2022. Air Emissions Requirement Policy for the Industrial Heartland Designated Industrial Zone. Alberta Environment and Parks Air Emissions Requirement Policy. October 2022.

EPA. 2022. Turbidity Monitoring for In-stream Construction Activities. Available at: https://open.alberta.ca/dataset/96dceba6-e6ce-48c1-a926-af5033cceef8/resource/71503820-3c67-46ab-b2e1-ea655c2e821e/download/epa-construction-activities-creating-turbidity-in-waterbodies-guideline-2023-07.pdf. Accessed March 2025.

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.

FAP (Fort Air Partnership). 2024a. 2023 Ambient Air Quality Monitoring Annual Network Report and Data Summary. Fort Air Partnership. 2024.

FAP. 2024b. Report to the Community 2023. Fort Air Partnership. April 2024.

GOA (Government of Alberta). 1997. *Wildlife Act* Wildlife Regulation. 1997. Alberta Regulation 143/1997. With amendments up to and including Alberta Regulation 62/2016. Published by Alberta King's Printer.

GOA. 2014. Profile of the North Saskatchewan Region. Environment and Sustainable Resource Development. Land Use secretariat. 9th floor, Centre West Building. 10035 – 108 Street. Edmonton, Alberta, Canada. ISBN: 987-1-4601-1715-6 (online version). Available at: https://landuse.alberta.ca/LandUse%20Documents/Profile%20of%20the%20North%20Saskatchewan%20Region%20-%202014-05.pdf. Accessed March 2025.

GOA. 2015. Cumulative Clubroot Infestations (2003-2015) Map. Alberta Canola Commission. Available from: https://albertacanola.com/wp-content/uploads/2016/02/clubroot-infestation-map-Dec-3-2015.pdf

GOA. 2018. Athabasca Watershed Council; Regional Base Map. November 2018. Available at: https://awc-wpac.ca/wp-content/uploads/2018/11/AthabascaWatershedCouncil_20181119.pdf.

GOA. 2022. Guideline for Industrial Operators in the Heartland Designated Industrial Zone for Conservation, Off-Site Storage and Off-site Use of Topsoil. Available at: https://open.alberta.ca/dataset/e99d421c-313b-4c5c-a35c-9b198312aa20/resource/6e91eb2b-7453-4ff2-ae00-57664b5b08ec/download/aep-guideline-for-industrial-operators-in-heartland-diz-for-conservation-2022.pdf. Accessed March 2025.

GOA. 2024a. Regional Dashboard, Edmonton Residential Vacancy. Availability at: https://regionaldashboard.alberta.ca/region/edmonton/residential-vacancy/#/?from=2019&to=2023

GOA. 2024b. Species assessed by the conservation committee: Alberta species at risk. Date modified 2024-01-29. Available at: https://open.alberta.ca/dataset/0b3421d5-c6c1-46f9-ae98-968065696054/resource/fcc339c9-62cf-4d9e-92e9-ec5e4277155f/download/epa-species-at-risk-assessed-alberta-2024-01.pdf. Accessed March 2025.

GOA. 2025a. Wildlife sensitivity maps. Endangered And Threatened Plants Ranges [shapefile]. https://www.alberta.ca/wildlife-sensitivity-maps.aspx. Accessed January 2025.

GOA. 2025b. Fish and Wildlife Management Information System (FWMIS) - Hydrology Arcs. Last Updated January 15, 2025. Available at: https://geodiscover.alberta.ca/geoportal/rest/metadata/item/a969ea3b1486440db525eb7f07188133/html. Accessed March 2025.

GOA. 2025c. Fish and Wildlife Management Information System (FWMIS) - Hydrology Polygons. Last Updated January 15, 2025. Available at: https://geodiscover.alberta.ca/geoportal/rest/metadata/item/1b204f5525a948a29e168b25020eed9f/html. Accessed March 2025.

GOA. 2025d. 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.

GOC. 2023. Guidelines to avoid harm to migratory birds. Available at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/reduce-risk-migratory-birds.html. Accessed March 2025

GOC. 2025. Species at Risk Act Public Registry. Available at: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html. Accessed March 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.

NCIA (Northeast Capital Industrial Association) 2022. Regional Noise Model (RNM). July 2024. Accessed online at https://www.ncia.ca/; https://lifeintheheartland.com/heartland-101-july-2024/

Page, L., K. Bemis., T. Dowling, and H. J. Walker. 2023. Common and Scientific Names of Fishes from the United States, Canada, and Mexico, 8th Edition. DOI: 10.47886/9781934874691

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. 2013. Sasol Canada Gas-to-Liquids Project Environmental Impact Assessment. Available at: https://open.alberta.ca/dataset/f31e6946-ac74-44cf-90e9-2fec83808ab7/resource/76eec2b0-92c7-4b25-9ef2-85cc4abea88b/download/sasol-gtl-project-volume-1-project-description.pdf

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. 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

Sturgeon County. 2022. Sturgeon County 2022 to 2025 Strategic Plan. Accessed May 2025. Available at: https://www.sturgeoncounty.ca/wp-content/uploads/2024/01/Strategic-Plan-2022-2025.pdf

Total E&P Canada Ltd. 2007. Upgrader Project - Environmental Impact Assessment. December 2007. Available at: https://open.alberta.ca/dataset/c66931e1-b067-4179-96af-ac47f1b31910/resource/6054814a-61f9-4f80-bb10-8624d2e98532/download/vol1executivesummary.pdf

Appendices

Appendix A

Newsletter

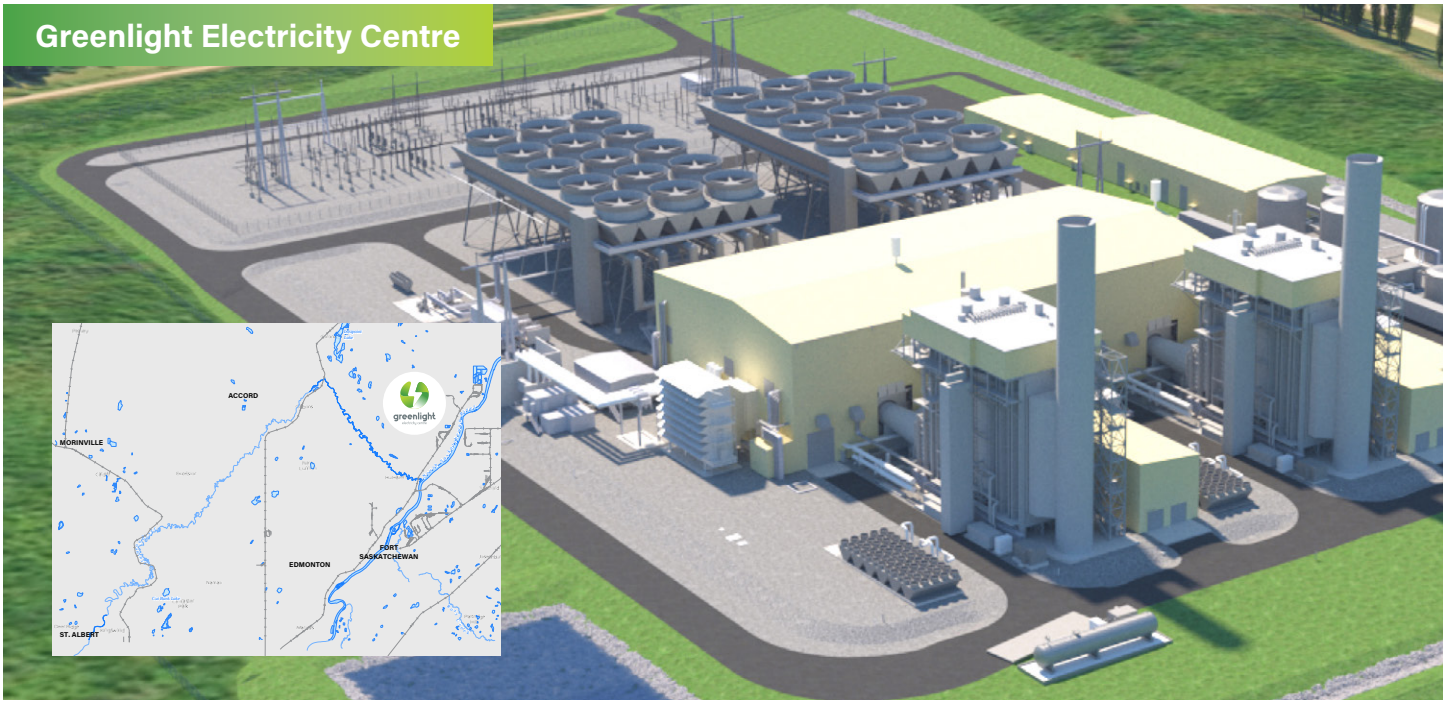
greenlight
electricity centre

May 2025

Newsletter

greenlight
electricity centre

Greenlight Electricity Centre



OPEN HOUSE

Please join us at our community **open house** to learn more about the **Greenlight Electricity Centre** and to meet the Project team.

Thursday, June 26, 2025
5:00 p.m. – 8:00 p.m.
Gibbons Cultural Centre
5115 52st Street
Gibbons, Alberta T0A 1N0

***Greenlight** representatives will be available to share Project specific information, including studies being conducted to assess impacts to noise and air emissions and to gather feedback from the community. Light refreshments will be served. We look forward to seeing you.*

Greenlight Electricity Centre (Greenlight) is a strategically located power plant in Alberta's Industrial Heartland. With 160 acres of secured land, the project is designed to be built in two to three phases, ultimately providing approximately 1,864 megawatts (MW) of capacity. The facility will leverage modern, high-efficiency industrial turbines fueled by natural gas and will capture waste heat to generate additional electricity via a steam turbine. In the future, carbon capture technology could be integrated into the facility, with infrastructure in place to support carbon sequestration.

THE NEED

Addressing the Evolving Energy Landscape

Greenlight Electricity Centre will address Alberta's increasing energy demand, particularly from the rapid growth of data centres. This demand surge is driven by advancements in artificial intelligence (AI), cloud computing, and digital transformation, with global data centre electricity consumption projected to double by 2027, reaching 2.6% of global electricity usage.

Why Greenlight Matters

Greenlight Electricity Centre plays a crucial role in supporting both data centres and the overall increase in energy demand, while aligning with national and provincial sustainability goals:

- The electrification of transportation and industry is expected to drive a significant rise in electricity demand.
- The Province of Alberta is actively seeking $100 billion of investment in AI technology to drive innovation, create jobs and diversify its economy. All of which will create additional power requirements within the province.

Leveraging Alberta's Natural Gas Advantage

Alberta's abundant natural gas reserves provide one of the cleanest, most cost-effective, and efficient energy sources. Greenlight Electricity Centre will capitalize on this resource to deliver stable, low-carbon electricity that supports Alberta's growing industries and digital economy.

Powering the Next Generation of Innovation

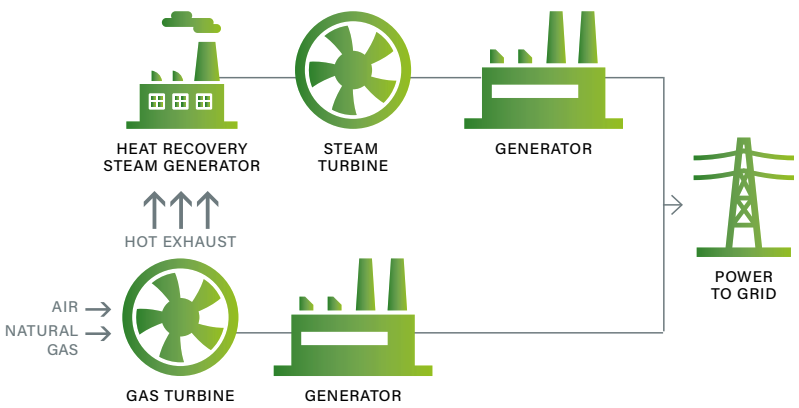
With its strategic location, high-efficiency power generation, and future-ready infrastructure, Greenlight Electricity Centre is positioned to be a cornerstone of Alberta's energy future—supporting the province's digital transformation and economic growth.

Combined Cycle Power Generation: Efficiency & Sustainability

Greenlight Electricity Centre will utilize **combined cycle power generation**, a highly efficient and environmentally responsible approach to electricity production. This technology combines gas and steam power production, where:

- A **gas turbine generator** uses natural gas as fuel to produce electricity.
- Waste heat from the exhaust is captured to produce **steam**, which drives a **steam turbine generator** to generate additional electricity.
- This process increases energy efficiency by up to **50% compared to traditional gas turbine generators**.

To fuel the facility, natural gas will be supplied via a pipeline tied into Alberta's existing natural gas network, ensuring a steady and reliable energy source.



The project will require a connection to the electrical grid, a natural gas pipeline, and a water source. The site location is considered extremely favourable due to its proximity to these essential services:

Electricity

Power will be supplied by interconnecting with an AltaLink substation near the project site via a short transmission line.

Natural Gas

A new supply pipeline will be constructed, tying into an existing natural gas transportation network located nearby.

Water Usage

Limited water is required, as the project will utilize air-cooled condensers. The steam cycle requires minimal make-up water, which will be sourced locally.

Environmental Commitment

Greenlight is committed to minimizing environmental impacts through best practices and rigorous management programs. The focus will be to meet or exceed industry standards and environmental regulations, ensuring responsible power generation.

The project is being designed and will be operated in a manner that minimizes potential environmental effects while supporting Alberta's efforts to diversify and clean its power production mix. As part of the regulatory application, comprehensive environmental studies and assessments will be conducted, including:

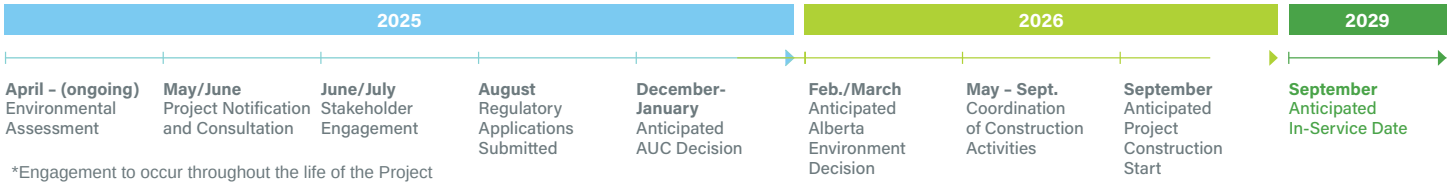
Air Quality — A dispersion modeling assessment, compliant with the Alberta Air Quality Model Guideline (AQMG), will be completed to evaluate Greenlight's impact on air quality. The facility will meet the National Base Level Industrial Emissions Requirements (BLIERS).

Noise Assessment — A detailed noise impact study will assess Greenlight's impact during both the construction and operational phases. The facility will comply with regulatory noise limits, including the Alberta Utilities Commission (AUC) Rule 012: Noise Control.

Field Surveys — Various environmental surveys and desktop reviews focusing on soils, vegetation and wildlife have been conducted and will continue as part of the development process.

Carbon Capture — The ability to integrate carbon capture in the future would lead to over 90% of carbon emissions from the combined cycle generating units being captured and permanently stored in a local carbon sequestration hub.

Timeline at a Glance



*Engagement to occur throughout the life of the Project

Greenlight is being designed and will be operated to minimize environmental impacts while supporting the rising electricity demand in Alberta.

Adding Value In Alberta with Local Opportunities

Greenlight will create power for a sustainable future. Integrated combined cycle power generation will provide reliable, on-demand power, which will help keep electricity costs competitive and support Alberta's transition to a diverse and low-carbon energy future.

Efficiency and optimization of resources are critical. Greenlight will be a reliable supply of electricity which will help the Alberta Electric System Operator (AESO) integrate renewable resources into the transmission grid as more solar and wind projects come online, helping to protect consumers against price spikes and volatility.

Greenlight is expected to cost $4-6 billion when fully complete. Should the project receive regulatory approval, it is anticipated that it will be developed in phases, with each phase requiring approximately three years of construction and approximately 4,500,000 workforce hours to complete. During operations, a full-time workforce of approximately 40 personnel will be supported by local services and contractors as needed.

Anticipated Project Schedule

Summer 2025: Completion of environmental studies, Indigenous and public engagement, and submission of regulatory applications to the Alberta Utilities Commission (AUC) and Alberta Environment (AE).

Spring 2026: Regulatory approval and contract awards for construction and equipment.

Fall 2026: Construction begins.

Fall 2029: Planned in-service date for the first phase.

Community Involvement and Benefits

The construction and operation of Greenlight will play a significant role in the local economy by providing well-paying jobs that benefit Indigenous and local communities. It will utilize local businesses and suppliers and generate additional tax revenue for Sturgeon County.

Greenlight is committed to working collaboratively with all stakeholders to address concerns and answer questions about the project.

Greenlight believes that strong Indigenous and stakeholder relationships lead to better business decisions. We strive to build long-term relationships by engaging with and listening to our neighbours, maintaining an open and respectful dialogue for years to come.

What can I expect during construction and operations?

We will continue to engage with stakeholders to understand how we can minimize impacts to nearby residents during the construction phase.

Visual Impact
The proposed Project site is located on a cleared site and would be visible from Highway 643. To reduce the visual impact of the facility, Greenlight will continue to assess options to modify the overall site plan.

Traffic Impact
Construction of the facility may impact traffic at various times during large equipment delivery. The project will prioritize safety and adhere to an approved traffic management plan.

Hours of Operation
We anticipate the project's working hours to be from 7:00 a.m. to 10:00 p.m.

For more information:

Email: rthomas@greenlightelectricitycentre.ca
Phone: Rob Thomas 403-815-0203

For more information about the Project, please visit:

www.greenlightelectricitycentre.ca