BEACON AI CENTERS

Beacon AI Centers Heartland Project

Initial Description of Designated Project

Prepared for:

IMPACT ASSESSMENT AGENCY OF CANADA

Prepared by:

JOULEGRID

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Acronyms / Abbreviations

AAAQO/G	Alberta Ambient Air Quality Objectives/Guidelines
AACSW	Alberta Arts, Culture and Status of Women
ACC	Air-cooled condenser
ACIMS	Alberta Conservation Information Management System
ACO	Aboriginal Consultation Office
AEPA	Alberta Environment and Protected Areas (formerly AEP/AENV)
AEP	Alberta Environment and Parks
AER	Alberta Energy Regulator
AESO	Alberta Electric System Operator
AGC	Automatic Generation Control
Agency	Impact Assessment Agency of Canada
AIES	Alberta Interconnected Electric System
AIH / IH-DIZ	Alberta's Industrial Heartland – Designated Industrial Zone
AQHI	Air Quality Health Index
AQMG	Alberta Air Quality Modelling Guideline
ASL / asl	Above sea level
ATS	Automatic Transfer Switch
AUC	Alberta Utilities Commission
AWA	Alberta Wildlife Act
Bgs	Below ground surface
Beacon	Beacon AI Centers
$CaCO_3$	Calcium carbonate
CCS	Carbon capture and storage
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
COD	Commercial Operation Date
DIZ Framework	Designated Industrial Zone Regulatory Framework
DTS	Demand Transmission Service
STS	Supply Transmission Service
EC	Electrical conductivity
EIA	Environmental Impact Assessment
EPEA	Environmental Protection and Enhancement Act
ESC	Erosion and Sediment Control
ESA	Environmentally Significant Area
FAN	Federation of Alberta Naturalists
FAP	Fort Air Partnership
FWIMT	Fish and Wildlife Internet Mapping Tool
GGP	Gas Generation Pod(s)
GHG	Greenhouse gas
GOA	Government of Alberta
GOC	Government of Canada
GPS	Global Positioning System
GSU	Generator Step-Up
GWh	Gigawatt-hour
Ha / ha	Hectare
HAMP	Heartland Air Monitoring Partnership
HBM	[Soil series code from Bock 2016]
HPC	High-performance computing
HRA	Historical Resources Act
HRSG	Heat recovery steam generator
IAAC	Impact Assessment Agency of Canada
IH-DIZ	Designated Industrial Zone
INNIO	Engine/Generator manufacturer (Jenbacher)
IPCC	Intergovernmental Panel on Climate Change
Km	Kilometre
kPa	Kilopascal
kV	Kilovolt
LAIRT	Landscape Analysis Indigenous Relations Tool
LFH	Litter / Fermentation / Humus horizon
LFN	Low-frequency noise
LiDAR	Light Detection and Ranging
LCRC	Land Conservation and Reclamation Council
LSR	Land Suitability Rating
m	metre (unit)
m^3	Cubic metre
m^3/day	Cubic metre per day
MBCA	Migratory Birds Convention Act
Montrose	Montrose Environmental Solutions Canada
MSSC	Master Schedule of Standards and Conditions
MW	Megawatt
N_2O	Nitrous oxide
NGTL	Nova Gas Transmission Ltd.

NIA	Ammonia
NIA	Noise Impact Assessment
Nox	Oxides of nitrogen
NSRP	North Saskatchewan Regional Plan
PAH	Polycyclic aromatic hydrocarbons
PHS	Peace Hills soil series
PIP	Participant Involvement Plan
PLC	Programmable Logic Controller
PM_{10}	Particulate matter ≤ 10 µm
$PM_{2.5}$	Particulate matter ≤ 2.5 µm
PF	Power factor
PSIP	Project-specific information package
PSL	Permissible sound level
PSLs	Permissible sound levels (plural)
psi	Pounds per square inch
Q1	First quarter
Q2	Second quarter
Q3	Third quarter
QPAC	Quick-Deploy Power And Containerized system
RAP	Restricted Activity Period
RNM	Regional Noise Model
RNMP	Regional Noise Management Plan
SAR	Sodium Adsorption Ratio
SARA	Species at Risk Act
SASR	System Access Request Service
SCADA	Supervisory Control and Data Acquisition
SCA	Soil Correlation Area
SCWG	Soil Classification Working Group
SCR	Selective catalytic reduction
SMU	Soil Map Unit
Species of Conservation Concern	
SSIG	Sensitive Species Inventory Guidelines
TAA	Terrestrial Assessment Area
TF/EE	Transboundary flows / exceptional events
the Project	— Beacon AI Centers Heartland
TJ/hr	Terajoules per hour
TSP	Total suspended particulate
UPS	Uninterruptible Power Supply
VC	Valued component
VOC	Volatile organic compound
W4M	West of the Fourth Meridian
WAA	Wildlife Assessment Area
ZGW	
	Undifferentiated Gleysols
µm	Micrometre

PART A: General Information

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

Heartland Power Generation LP and its general partner Northbridge Power GPC Inc. (Heartland Power) is submitting this Initial Project Description (IPD) for the 920 Megawatt-electric (MWe) “Beacon AI Centers Heartland” power generation facility (the Project). The Project is being developed by Beacon AI Centers (Beacon) under the Project-specific entity Heartland Power.

This IPD has been prepared following the Impact Assessment Agency of Canada (Agency or IAAC) Guide to Preparing an Initial Project Description, Annex 1 (IAAC 2024). Although this IPD is being submitted in accordance with the Physical Activities Regulations, Heartland Power understands that the IAAC aligns its implementation of the *Impact Assessment Act* and regulations with the Supreme Court of Canada's (SCC) decision in *Reference re Impact Assessment Act* (SCC Reference). If the Project can be carried out without requiring any Federal authorizations or permits, because of the SCC Reference, the Impact Assessment Act ought not to apply to the Project. Furthermore, as demonstrated through the information provided herein, the Project will not result in "non-negligible adverse change" within federal jurisdiction.

1.1 Project Name

Beacon AI Centers Heartland

1.2 Type or Sector

The Project is a power generation facility with a capacity of 920 MWe, providing 800 MWe of continuous, dispatchable electricity to the four on-site data centres. The Project features two hundred INNIO Jenbacher J624 lean-burn natural-gas reciprocating engine power generators, organized into Quick-deploy Power and Containerized system (QPAC) modules. Each QPAC module integrates five of each reciprocating engines, alternators, exhaust-treatment systems and air-cooled radiators within a single three-storey steel enclosure engineered for industrial acoustic performance and emissions compliance. The QPAC modules are then arranged into four (4) gas generation pods (GGPs) (i.e., ten QPAC modules per GGP).

The major ancillary structures include:

- Natural gas pipeline to fuel the Project. The pipeline will be part of the existing integrated Nova Gas Transmission Ltd. (NGTL) and ATCO Pipeline system located 0.5 kilometre (km) east of the Project. The Project will require up to 218 Terajoules per day (TJ/day) at capacity.
- Four (4) data halls with a power requirement of 200MW, totaling 800MW. The Project is co-located with four (4) data halls as part of an on-site data center capable of supporting Tier IV data-centre operations. Although Heartland Power is including information related to the data center at the request of the Impact Assessment Agency of Canada, information pertaining to the data center is not relevant to the assessment of the Project because the data center is not a Project component and is not associated with the construction, operation or decommissioning of the Project. Heartland Power is providing the most accurate information and assumptions known at this time in respect to the data center and doing so exclusively for informational purposes.

- New substation and T-tap connection to an existing 240 kV transmission line owned by AltaLink with the point of interconnection 3.5 km away from the Project. Electricity will be delivered from the Project to the Alberta provincial grid through several transmission lines with the point of interconnection expected to be in Heartland substation 12S (53.85803° or 53° 51' 29" north, -113.23008° or 113° 13' 48" west). One (1) new on-site substation with a listed capacity of 400 MWe is currently configured. The final substation capacity and configuration will be determined in the coming months as the project progresses through the AESO (Alberta Electric System Operator) connection process.

1.3 General Project Location and Land Use

The Project is located approximately 7 km east of Gibbons Alberta, immediately north-northeast of the Junction of Secondary Highway 643 and Range Road 223, as shown in Figure 1.1.1.

The Project is in Alberta's Sturgeon County Industrial Heartland – Designated Industrial Zone (IH-DIZ) (Sturgeon County 2017; Government of Alberta 2014).

- Legal land description: NW and SW Quarters of Section 15-56-22-W4M
- Deg-Min-Sec Latitude and longitude coordinates: 53°50'23"N, 113°11'34"W
- Decimal Latitude and longitude coordinates: 53.84032, -113.192246

The Project is located within a 317 acres (128.3 hectares (ha)) data center campus at an elevation of approximately 644 metres. The Project will occupy a 32-acre footprint - arranged into four (4) gas generation pods (GGPs) - within the data center campus.

The Project site is on privately owned land, which is already disturbed and previously used for agricultural purposes, as shown in Figure 1.1.2.

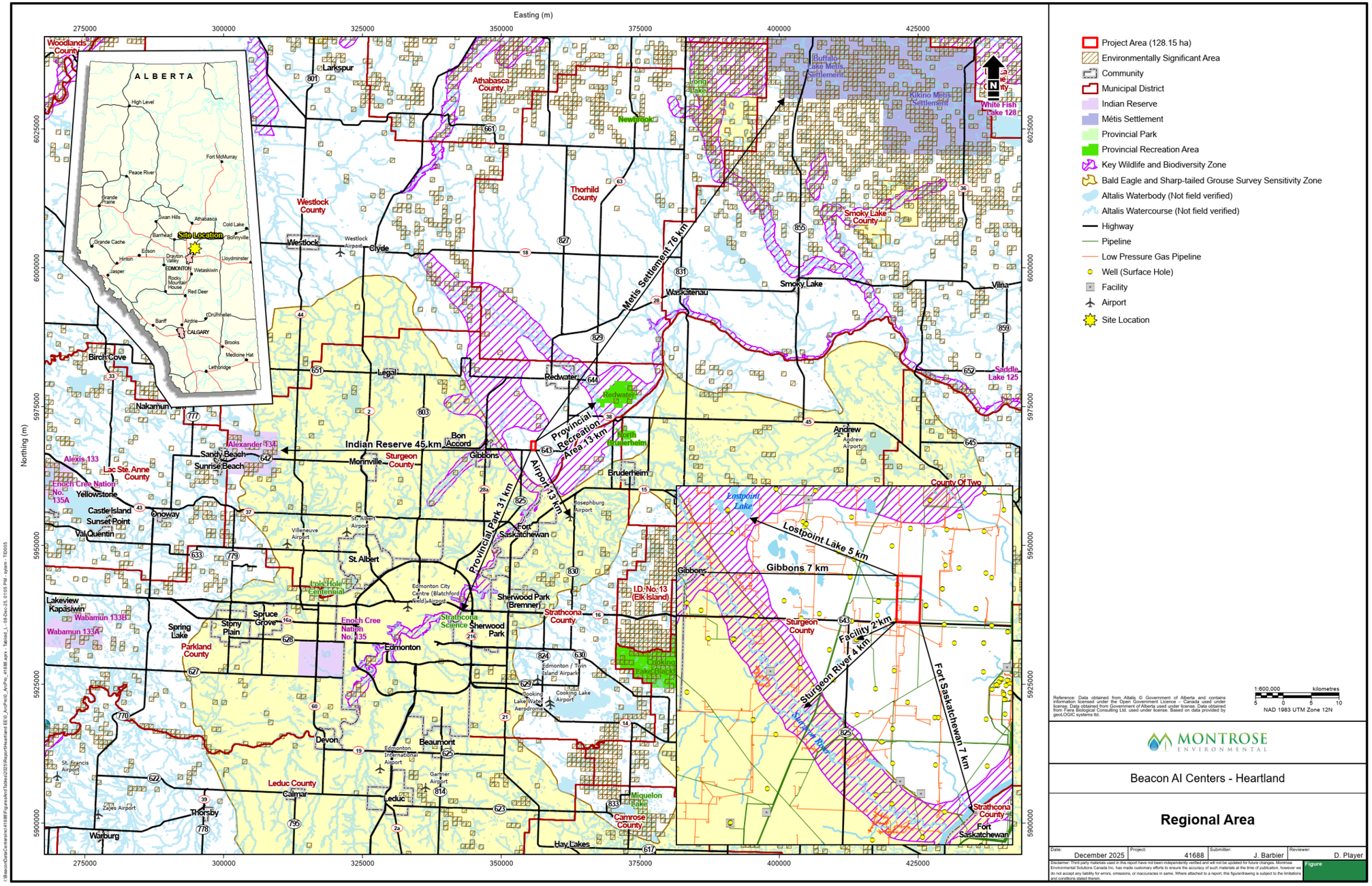

Figure 1.1.1 Regional Area

Figure 1.1.2 Project Site

December 14, 2025

2. Proponent's Name and Contact Information

Table 2.1.1 Proponent's Name and Contact Information

Name of Project:	Beacon AI Centers Heartland
Name of Proponent:	Heartland Power Generation LP and its general partner Northbridge Power GPC Inc. (Heartland Power)
Address of Proponent:	27 FL- 140 4th Avenue SW, Calgary, AB T2P 3N3
Website	https://beaconaicenters.com/
Principal Contact Person:	Joseph Shovlin, Co-Founder, Beacon Data Centers Email: joseph@beacondatacenters.com Phone: +1 825 964 4339 27 FL- 140 4th Avenue SW, Calgary, AB T2P 3N3
Regulatory Contact Person:	Troy Adams, Regulatory Lead (Joule Grid) Email: Troy.adams@joulegrid.ca Phone: T: 403.836.3535 (office & mobile) 27 FL- 140 4th Avenue SW, Calgary, AB T2P 3N3

3. Summary of Engagement with Jurisdictions or Agencies

Federal, provincial, and municipal agencies that have been or will be consulted regarding the Project are listed below. At the municipal level, Heartland Power/Beacon has engaged Sturgeon County to support local planning, permitting, and coordination within the IH-DIZ. Sturgeon County is very supportive of the Project. Engagement with agencies and stakeholders will continue throughout the course of the Project's development.

Table 3.1.1 Federal, Provincial and Municipal Agencies Engaged

Agency and Submission	Date	Purpose of Engagement	Next Steps
Impact Assessment Agency of Canada (IAAC) and Impact Assessment (IA)	Nov 2025 ongoing	Initial contact made to provide basic Project information and receive process direction in preparation for a submission.	Submit IAAC IA, Annex 1
Alberta Arts, Culture and Status of Women (AACSW)	Ongoing	Request for *Historical Resources Act* approval for Project	*Historical Resources Act* approval granted on December 05, 2025. Any chance discovery of historical resources must be reported
Alberta Electric System Operator (AESO) and System Access Service Request (SASR) applications	Nov 2025 ongoing	Initial contact made to provide basic Project information and receive process direction in preparation for a submission. A system access service request (SASR) for Demand Transmission Service (DTS) (receiving power from grid), in respect to the data center halls has been submitted.	A system access service request (SASR) for Supply Transmission Service (STS) (exporting power to grid) will be submitted.
Alberta Environment and Protected Areas (AEPA) – Environmental Impact Assessment (EIA)	Nov 2025 ongoing	Initial contact made to provide basic Project information and receive process direction in preparation for a submission.	Submit the required application prior to December 31, 2025.
Alberta Environment and Protected Areas (AEPA) – Industrial Approval Application	Nov 2025 ongoing	Initial contact made to provide basic Project information and receive process direction in preparation for a submission.	Submit Industrial Approval Application prior to December 31, 2025.
Alberta Utilities Commission (AUC)	Nov 2025 ongoing	Initial contact made to provide basic Project information and receive process direction in preparation for a submission.	Submit AUC Power Plant Application prior to December 31, 2025.
Aboriginal Consultation Office (ACO)	Nov 2025 ongoing	Initial contact made to provide basic Project information and receive process direction in preparation for a submission.	ACO confirmed no consultation is required as the Project is located on private land.
Alberta Transportation and Economic Corridors	Nov 2025 ongoing	Notification of Project and planning for transportation requirements	None at this time
Sturgeon County	Q1 2025 ongoing	Initial contact made to provide basic Project information and receive process direction in preparation for a submission. Submitted and received approval of the	Continue engagement as required for building permits and municipal coordination.

		development permit	
Alberta's Industrial Heartland Association	Q1 2025 ongoing	Initial contact made to provide basic Project information and receive support for the Project.	Ongoing coordination through Project development.

4. Engagement with Indigenous Groups, Public, Other Stakeholders

4.1 Indigenous Groups

Although the Project footprint is on private land with no expected *Water Act* applications with Crown interests, as a matter of due diligence and meeting the Crowns Duty to Consult, Heartland Power/Beacon opted to follow the Government of Alberta's Proponent Guide to First Nations, Metis Settlements and Credibly Asserted Métis Communities consultation procedures and submit a Pre-Consultation Assessment Request to the Aboriginal Consultation Office (ACO) for direction on consultation. The ACO reviewer deemed no consultation was required on December 8th, 2025. The ACO reviewer provided the Pre-Consultation Assessment Request decision on December 8th, 2025, recommending no consultation was required. according to the *AUC's Rule 007: Facility Applications (Appendix A1-B – Participant)*:

In recognition of the proposed Project being located in Treaty 6 territory, Heartland Power/Beacon has consulted with the following Indigenous Communities:

1) Alexander First Nation
2) Alexis Nakota Sioux Nation
3) Beaver Lake Cree Nation
4) Cold Lake First Nations
5) Enoch Cree Nation #440
6) Ermineskin Cree Nation
7) Frog Lake First Nation
8) Heart Lake First Nation
9) Kehewin Cree Nation
10) Louis Bull Tribe
11) Friends of Michel Society (former Michel Indian Band)
12) Montana First Nation
13) O'Chiese First Nation
14) Onion Lake Cree Nation
15) Paul First Nation
16) Saddle Lake Cree Nation
17) Samson Cree Nation
18) Sunchild First Nation

19) Whitefish Lake Indian Reserve #128 (Whitefish (Goodfish) Lake First Nation)
20) Buffalo Lake Métis Settlement
21) Kikino Métis Settlement
22) Lac Ste. Anne Métis Community Association
23) Métis Nation of Alberta - Otipemisiwak Métis Government

The Indigenous groups near the Project are shown in Figure 4.1.1.

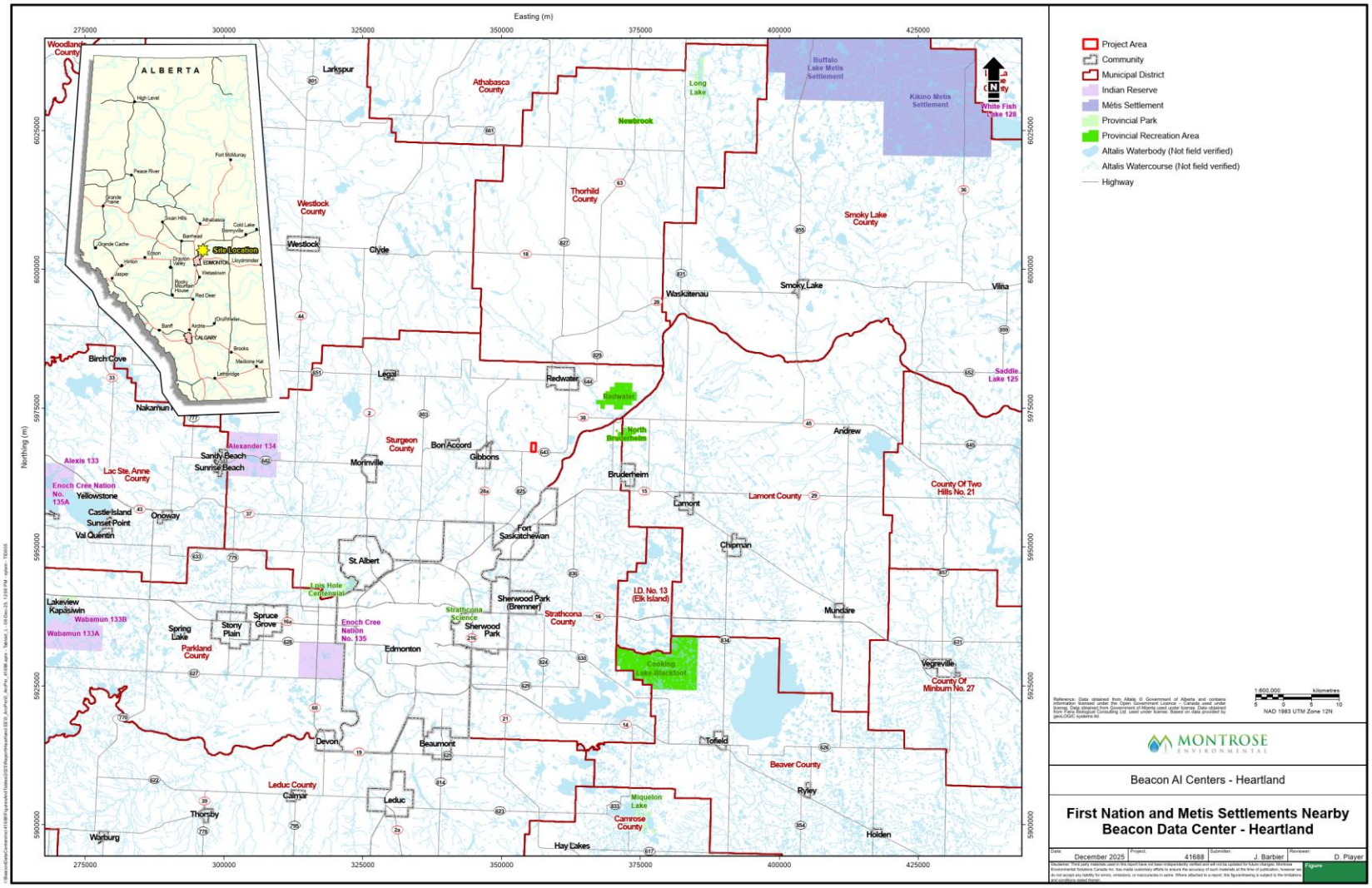

Figure 4.1.1 First Nation and Metis Communities Nearby Beacon AI Centers – Heartland Project

4.2 Engagement with Indigenous Groups

Heartland Power/Beacon acknowledge and respect the rights of Indigenous people. Heartland Power/Beacon sent a Project-specific information package (PSIP) via email on November 14, 2025, to the identified Indigenous Communities listed above. The November 2025 Project notification included:

1. An introductory cover letter with a Project and Proponent description;
2. An open house invitation;
3. Project mapping; and
4. AUC brochure titled Public Involvement in a Proposed Utility Development.

The Friends of Michel Society, formerly the Michel Indian Band, contacted the Proponent via email on November 28, 2025, to request inclusion in the AUC Participant Involvement Plan (PIP). They were added to the Indigenous contact list and were included in further Project updates as well as meetings as requested.

Indigenous Communities were offered meetings with the Proponent to discuss the Project. The Proponent met with:

- O'Chiese First Nation
- Onion Lake Cree Nation
- Kikino Metis Settlement
- Ermineskin Cree Nation
- Louis Bull Tribe
- Samson Cree Nation
- Friends of Michel Society (former Michel Indian Band)

See Appendix A for a full engagement summary, PSIP materials and all issues and concerns raised.

Plans for Future Engagement

Heartland Power/Beacon are 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. Indigenous Consultation will continue throughout the Project lifecycle. Heartland Power/Beacon welcome feedback about the Project at any time and is committed to engagement as the Project moves through the approval process.

4.3 Results of Engagement and Key Issues Raised

During consultation and engagement activities, O'Chiese First Nation requested a Technical Review, however, to date no budget, or scope has been received. Heartland Power/Beacon will continue to communicate with the Nation to provide Project updates and discuss the scope of a technical review as more details are provided.

Heartland Power/Beacon will continue to communicate with Indigenous Communities and Stakeholders following the Project application being submitted. Additional notifications will be circulated to provide updates on further Project submissions and next steps.

Heartland Power/Beacon are committed to ongoing and open dialogue with all Indigenous Communities, Stakeholders, Municipalities, and special interest groups who have interest in the Project. Heartland Power/Beacon are determined to plan, develop and operate the Project with a respectful, socially, environmentally, and economically responsible approach.

4.4 Engagement with Public and Other Stakeholders

Identified Stakeholders and Interested Parties

The Project will be located on private land in Sturgeon County and is near Strathcona County and Lamont County. Table 4.4.1 lists the potentially affected and interested stakeholder groups for the Project.

Table 4.4.1 Potentially Affected Stakeholder Groups

Affected	Stakeholders
Directly Affected	Occupants, landowners, and residents (within an 800 m consultation radius of the Project boundary)
Nearby / Adjacent	Occupants, landowners, and residents (within a 2,000 m notification radius of the Project boundary)
Federal Government	Impact Assessment Agency of Canada
Provincial Government	Alberta Environment and Protected Areas Alberta Aboriginal Consultation Office Alberta Arts, Culture and the Status of Women Alberta Utilities Commission Alberta Electric System Operator
Local / Regional Government	Sturgeon County, Alberta Strathcona County, Alberta Lamont County, Alberta Town of Gibbons, 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

Engagement Activities Undertaken

Table 4.4.2 Stakeholder Engagements Undertaken

Method	Audience	Action
Introductory Packages and Responses	Approximately 18 landowners located within 2 km of the Project boundary	Sent via email, regular mail or hand delivered: • An introductory cover letter including a Project and Proponent description • An open house invitation • Project mapping • AUC Brochure titled Public Involvement in a Proposed Utility Development
Open House on November 18, 2025 at Gibbons Community Cultural Centre, Gibbons	Indigenous Communities County representatives Landowners Industry representatives	Presented high-level description of the Project, Studies and results to date

Results of Engagement and Key Issues Raised

The key concerns raised by Indigenous Communities, Stakeholders, Municipalities and Associations during the Open House event and throughout consultation and engagement are summarized in Table 4.4.3 below. Please refer to Appendix A for further details.

Table 4.4.3 Issues, Concerns and Mitigations

Key Concerns	Specific Interests	Response/Mitigative Measure
Land Use	Change of Land Use	The Project will be situated on private agricultural land within the Industrial Heartland Designated Industrial Zone in Sturgeon County, approximately eight kilometers east of Gibbons
Noise Impact	Impact that sound may have on neighbours, community or region.	The Project will comply with AUC Rule 012 noise standards, implementing design and site-specific mitigation measures such as silencers and acoustic barriers to ensure sound levels remain within permissible limits at nearby receptors. Noise modeling predicts compliance with daytime and nighttime limits without low frequency noise effects.
Air Impact	Impacts to air quality from the power generation proposed at the site.	Dispersion modeling indicates that emissions of NO_2 (Nitrogen Dioxide), CO_2 (Carbon Dioxide) and $PM_{2.5}$ (particulate matter with a diameter of 2.5 micrometers or smaller) from the Project will remain below Alberta's Ambient Air Quality Objectives/Guidelines, with minor increases attributable primarily to existing regional industrial facilities rather than the Project itself.
Water Usage	Project participants have read concerns that Data Centres use	The Project has an approved permit for municipal treated potable water use at 1,500 cubic meters

	excessive amounts of water.	per day, addressing concerns about excessive water consumption by data centers.
Consultation Commitment	When will consultation end.	Beacon AI Centers commits to ongoing engagement with communities and stakeholders throughout the Project's lifespan, providing updates and addressing inquiries.

Plans for Future Engagement

Heartland Power/Beacon will continue to communicate with Indigenous Communities and Stakeholders following the Project application being submitted. Additional notifications will be circulated to provide updates on further Project submissions and next steps. Heartland Power/Beacon is committed to ongoing and open dialogue with all Indigenous Communities, Stakeholders, Municipalities, and special interest groups who have interest in the Project. Heartland Power/Beacon is determined to plan, develop and operate the Project with a respectful, socially, environmentally, and economically responsible approach.

Heartland Power/Beacon intend to maintain the community relationships it has formed, as well as foster potential business and capacity development opportunities to ensure long-term community growth and well being.

One-on-one Meetings

Heartland Power/Beacon 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.

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.

5. Study or Plan, Relevant to The Project

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 defines key principles and operational policies for managing a designated industrial zone and provides guidance to partners and statutory decision-makers on processes and protocols. The IH-DIZ is municipally zoned for heavy industrial use, and the management processes and operational policies outlined in the DIZ Framework are designed to align with this long-term management intent.

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

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 (FAP 2024a; FAP 2024b) 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 Relevant to The Project

No strategic assessments have been carried out that are relevant to the Project.

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

Heartland Power is proposing to construct, own and operate an electricity generation facility within a data center campus called the Beacon AI Centers Heartland project (the "Project") in Alberta's Industrial Heartland (AIH). The total electrical site production features a capacity of 920 MWe, providing 800 MWe of continuous, reliable, affordable and dispatchable electricity to the four on-site data centres and Albertans. The Project will form the cornerstone of a purpose-built digital-energy campus capable of supporting Tier IV data-centre operations while decreasing energy dependence from the provincial grid (the AIES). It will also contribute positively 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

The Project addresses Alberta's growing need for reliable, high-density electrical supply for data-centric industries, particularly artificial-intelligence (AI), high-performance computing (HPC), and cloud-service infrastructure. The Province of Alberta is actively seeking $100 billion of investment in AI technology to drive innovation, create jobs and diversify its economy.

This Project reduces dependency on provincial grid infrastructure by deploying a localized, modular power system integrated into data center campus, in alignment with Alberta's data center policies which will likely require data centers to "bring your own power".

Key outcomes:

- Reliability: 24 / 7 availability with < 1 minute start-up time and isolated redundancy.
- Scalability: Modular architecture enabling incremental 25 MW build steps.
- Sustainability: High-efficiency lean-burn operation, >95 % NO_x removal, and future hydrogen-fuel compatibility.
- Economic Development: Creation of up to 4500 construction jobs and 300 permanent positions, strengthening Sturgeon County's industrial base.

7.3 Project Benefits

The Project is part of a 317 acres (128.3 hectares) data center campus planned with sustainability and community in mind. Key features include environmental buffers, wetlands, and infrastructure upgrades that benefit both industry and residents.

Community Benefits:

- 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, Indigenous communities and business owners.
- Substantial tax contributions to Sturgeon County and Alberta Government.
- Collaboration with local colleges for technical training.
- Infrastructure enhancements including roads and utilities.

- Environmentally engineered wetlands and stormwater features.

Design Integration:

- Low-profile, architecturally screened power modules.
- Landscaping to blend industrial and natural spaces.
- Acoustic and visual buffer zones along perimeter.
- Stormwater ponds and vegetation corridors to support biodiversity.

8. Physical Activities Regulation

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

- *Physical Activities Regulations* (Government of Canada 2019a)
- *Information and Management of Time Limits Regulations* (Government of Canada 2019b)

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 (Government of Canada 2019a).*

The *Information and Management of Time Limits Regulations* set out the information that must be included in a project description. They also identify the criteria under which legislated timelines may be suspended, the guidance IAAC must provide to proponents, and the format in which information should be submitted (Government of Canada 2019b).

9. Activities, Infrastructure, Permanent or Temporary Structures and Physical Works

A list of all activities, infrastructure, permanent or temporary structures and physical works to be included in and associated with the construction, operation and decommissioning of the Project.

9.1 Project Structures

The Project is a power generation facility comprised of several permanent structures. The Project includes forty QPAC modules containing the 200 INNIO Jenbacher J624 lean-burn natural-gas engine generators. Each QPAC module integrates five reciprocating engines, alternators, exhaust-treatment systems, and air-cooled radiators within the single three-storey steel enclosure engineered for industrial acoustic performance and emissions compliance.

In addition to the QPAC modules, there will be permanent structures for the maintenance and lubricants storage. Other structures include outdoor switchgear.

The Project design incorporates controls to address potential environmental risks associated with:

- Stack emissions of oxides of nitrogen (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), fine particulate matter ($PM_{2.5}$) and carbon dioxide (CO_2);
- Noise from engine modules, radiator banks, and auxiliary equipment;

- Storage and handling of fuels, lubricants, coolants, and selective catalytic reduction (SCR) reagents;
- Stormwater management and runoff from developed industrial surfaces; and
- Decommissioning and removal of above-grade equipment at end of life.

Environmental-protection elements embedded in the design include:

- Compact generation layout within a 32-acre power-generation zone with acoustic enclosures, vertical exhaust stacks, and dispersion-controlled spacing to reduce off-site noise and air-quality effects;
- High-efficiency INNIO Jenbacher J624 engines with SCR systems providing approximately 95% NO_x reduction;
- Closed-loop glycol cooling with no process-water use or blowdown streams; and
- Stormwater ponds, ditches, and landscaped buffers functioning as runoff-management and environmental-separation features within the 317-acre campus.

In addition to the above described structures that comprise the Project, within the ~317 acre (~128.3 ha) site footprint, four data halls as shown, one substation and a storm drainage pond are currently under consideration.

The conceptual (Site Plan) layout is shown on Figure 9.1.1.

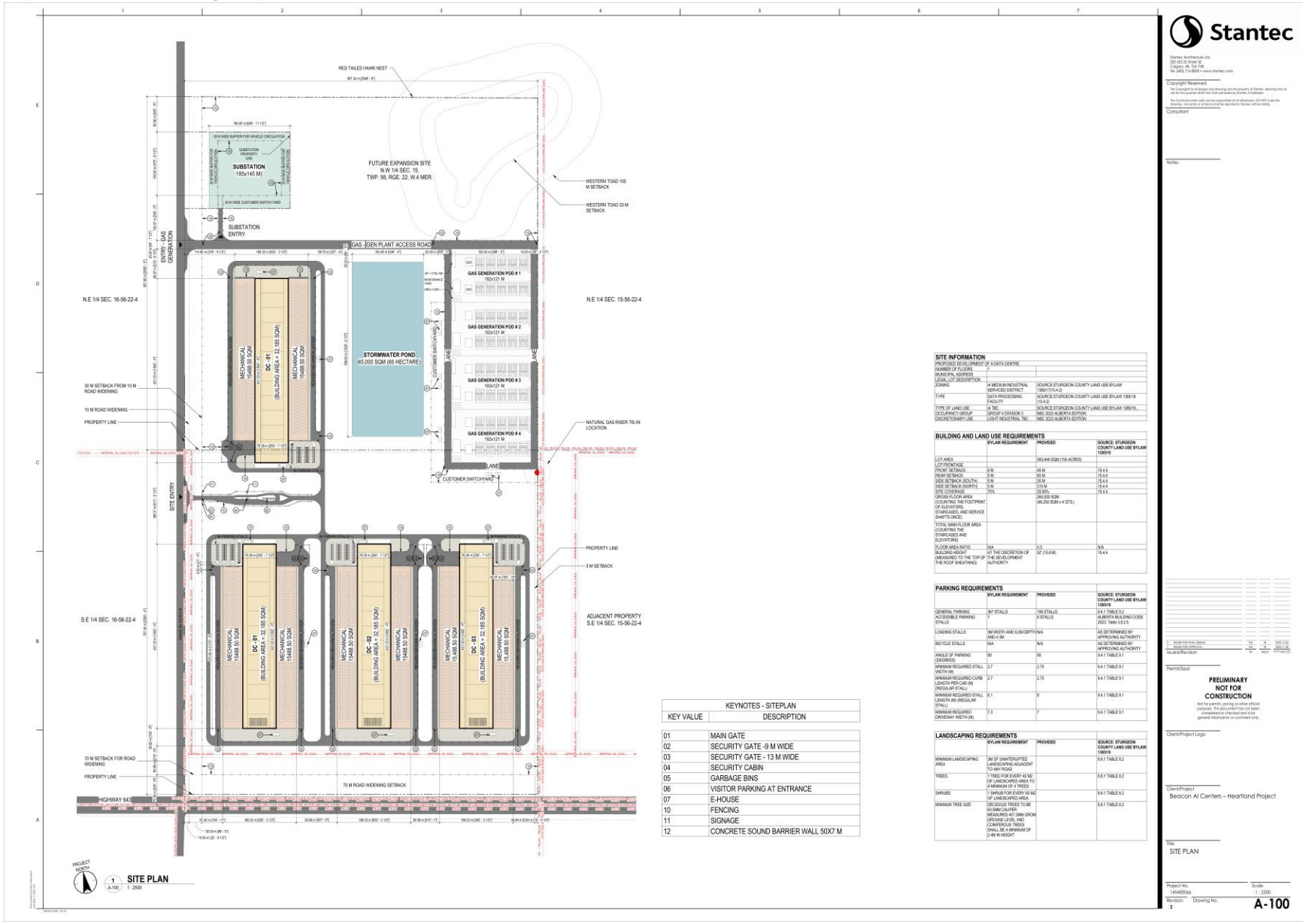

Figure 9.1.1 Site Plan

9.2 Plant Process Overview

The Project comprises of two hundred INNIO Jenbacher J624 lean-burn natural-gas engine generators, organized into QPAC modules.

Fuel supply and conditioning

- Sales-grade natural gas is delivered from the Nova Gas Transmission Ltd. (NGTL) system via new a lateral pipeline operating at approximately 250 Pounds per square inch (psi) (≈ 1 724 Kilopascal (kPa)).
- Once on site, the natural gas passes through a dual-train custody-transfer station with filtration, heating and redundant pressure regulators.
- Gas pressure is reduced at the engine manifolds and distributed to each QPAC module via buried, corrosion-protected carbon-steel piping equipped with double-block-and-bleed valves, flame arrestors and automated isolation.

Combustion and power generation

- Within each QPAC module, five Jenbacher J624 engines combust natural gas using a microprocessor-controlled ignition system and pre-chamber lean-burn combustion to optimize the air–fuel ratio and minimize NO_x formation.
- The engines convert fuel energy to mechanical output that drives 13.8 kV synchronous generators.
- Typical individual engine output is 4.6 MWe, resulting in approximately 920 MWe across 200 engines.

Exhaust treatment

- Engine exhaust flows to the upper deck of each QPAC module, where it passes through Selective Catalytic Reduction (SCR) systems achieving approximately 95 % NO_x removal from the combustion exhaust.
- Treated exhaust is released to atmosphere through the exhaust system on the upper level of each QPAC module.

Cooling and thermal management

- Engine jacket-water and charge-air heat are removed via closed-loop glycol circuits connected to air-cooled radiator arrays complete with spill containment within the enclosure.
- Total thermal rejection at full output is approximately 1 060 MW(th), dissipated via the radiator & heat exchanger loops.

Electrical Distribution

- Electrical power is generated at 13.8 kV, 60 Hz and transmitted within each QPAC module through local switchgear.
- Ten QPAC modules form one GGP. Each pod includes a 13.8 kV collector bus, pod-level protection and local control and can operate in islanded mode.
- Individual generation switchgear located at plant extremities convey the power at 24.5kV to the data centre auxiliaries.

Black-start capability

- The facility does not require separate black start capability. Each engine can restart without the provincial grid (AIES) or on-site auxiliary power.

Control and monitoring

- The plant is controlled from an Operations Control Centre (OCC) using redundant Programmable Logic Controller (PLCs) and IEC based Supervisory Control and Data Acquisition (SCADA).
- Automatic Generation Control (AGC) maintains frequency and voltage within tight tolerances, and real-time monitoring covers engine performance, emissions and electrical states across all QPAC modules and data halls.

9.3 Major Equipment

The major equipment and associated systems for the Project are summarized in Table 9.3.1.

Table 9.3.1 Major Equipment and Associated Systems

Project Feature	Description
Major Generation Equipment	INNIO Jenbacher J624 engines (200 units), lean-burn natural-gas-fired, each with an electrical production capacity of 4.6 MWe; arranged in 40 VoltaGrid QPAC modules (5 engines per module) within three-level steel acoustic enclosures. Synchronous generators rated at 13.8 kV, 6.9 MVA, 0.8 Power Factor (PF), direct-coupled to each engine.
Combustion and Fuel Systems	NGTL natural-gas lateral delivering sales-grade gas at approximately 250 psi (≈ 1 724 kPa) to a dual-train custody-transfer station (filtration, heating, regulation, metering). Gas is regulated at the engine manifolds and distributed via buried, corrosion-protected carbon-steel piping equipped with double-block-and-bleed valves, flame arrestors and automated isolation.
Exhaust and Emission Control Systems	Selective Catalytic Reduction (SCR) systems installed on each engine exhaust, achieving approximately 95 % NO_x reduction before discharge to atmosphere. Treated exhaust is released through the exhaust system on the upper deck of each QPAC module.
Cooling and Thermal Management	Closed-loop glycol cooling systems for engine jacket-water and charge air, with air-cooled radiator arrays and variable-frequency axial fans; no process-water use and no HRSG (Heat recovery steam generator) steam cycle.
Electrical Distribution	13.8 kV pod level switchgear; generator step-up (GSU) 13.8kV to 24.5kV transformers. Each pod ≈ 230 MWe; supplying the data-centre loads; 240 kV interconnection for future export & import to the AIES.
Black-Start and Backup Systems	Black-start capability is not required. Engines are all capable of starting independent of auxiliary power.
Control and Communications	Redundant PLC-based control, SCADA and communications; Operations Control Centre (OCC) supporting real-time monitoring of process, emissions and electrical states; AGC for microgrid operation.
Buildings and Site Infrastructure	QPAC generation modules, electrical substation, gas-metering compound, control and operations building, maintenance yard, stormwater pond, internal access roads and landscaped buffers within the 317-acre Beacon Heartland Industrial Zone site.

9.4 Raw Materials

Raw materials used by the Project are limited to natural gas fuel and auxiliary consumables associated with engine operation, emissions control and cooling.

Table 9.4.1 Raw Materials

Raw Material	Description	Average Operation	Maximum Operation	Emergency / Upset
Natural gas	Primary fuel for reciprocating engines; supplied from NGTL lateral at approximately 250 psi (≈1,724 kPa) and regulated to ≈400 kPa(g) at engine manifolds.	≈ (8.0 TJ/h)	(9.1 TJ/hr)	(9.1 TJ/hr)
Engine Oil	Engine lubricating oil	4640 Liters/day	5270 Liters/day	5270 Liters/day
SCR reagent (ammonia)	Injected into SCR reactors to achieve ≈95% NO_x removal from exhaust.	7 % by volume Fuel Consumption	8 % by volume Fuel Consumption	8 % by volume Fuel Consumption

No process water is required for engine cooling, and no steam cycle or heat recovery steam generator (HRSG) is included in the Project design. Potable and domestic water requirements for personnel and building services will be addressed separately in the infrastructure design and are not part of the industrial process description.

9.5 Products

Under normal operating conditions, the Project will produce the following principal product:

Electrical energy

- Installed capacity: 920 MWe.
- Configuration: 200, J624 engines in 40 QPAC modules (5 engines per module), arranged in four 230 MWe GGPs.

Annual net energy production (Gigawatt/year) will depend on operational dispatch, load profiles of the data-centre campus and grid-export conditions and will be finalized during detailed design and commercial arrangements. Annually the production of electricity will approach 7,008 GWh/year.

No steam, process heat or other industrial products are generated by the Project.

By-Products

The Project's main by-products are:

- Combustion exhaust gases from the power plants, treated through SCR systems prior to release via vertical stacks. Based on Table 23.1.1 (Air Quality) in the Project description, post-SCR emissions include:
    - NO_x, CO and VOC at low specific emission rates;
    - CO_2 (Carbon Dioxide) as the primary greenhouse-gas emission associated with fuel combustion;
    - $PM_{2.5}$

  Facility-wide emission totals (t/year) are presented in Table 23.1.1 and will be used in dispersion modelling and GHG inventory reporting.

- Waste heat rejected via the closed-loop glycol systems and air-cooled radiators, with total thermal rejection of approximately 1,060 MW(th) at full output per engine. This heat is dissipated to the atmosphere, with no process-water blowdown or steam-cycle exhaust.
- Operational wastes, including:
    - waste lubricating oil and filters from engines and auxiliary equipment;
    - spent SCR catalyst removed at the end of its service life;
    - waste glycol from cooling-system maintenance; and
    - general non-hazardous solid waste from maintenance and operations activities.

All wastes will be managed in accordance with applicable AEPA and Alberta Energy Regulator (AER) requirements and sent to licensed third-party waste-management facilities. More detailed characterization and volumes of waste streams will be provided in Section 24 (Substances Generated and Waste Management) once vendor data and maintenance schedules are finalized.

9.6 Facilities

Table 9.6.1 lists the expected tanks, buildings, or enclosures at the Project.

Table 9.6.1 Facility Buildings and Enclosures

Name	Type
Administration	Building
Data Centre Modules	Buildings
Gas Metering/Regulating	Building
Maintenance Yards	Building
QPAC Engine Modules (x40)	Industrial enclosures
SCR Reagent Storage	Building

Table 9.6.2 lists the total quantity of major equipment to be installed in the power plant area. This list is subject to revision based on final Project design.

Table 9.6.2 Power Generation Major Equipment

Name	Number
INNIO Jenbacher J624 Engine Generator	200
QPAC Modules - Enclosure	40
Closed-Loop Cooling Pumps - Engines	200
Fuel Gas Heater/Filter/Metering Trains	2 (dual-train)
SCR Reactor Systems – Per Engine	200
Generator Step-Up Transformer GSU (13.8 kV – 24.5kV)	200
Pod-Level 24.5 kV Switchgear	10 Switchgear Line Ups
24.5kV Distribution Bus	5 Sections per Switchgear Line Up
Control and Scada Systems	1 Per Engine
Operations / Control Centre Equipment	1 system for all generators

9.7 Ancillary Infrastructure

Table 9.7.1 Ancillary Infrastructure

Name	Type
Power Transmission Line and Interconnection	• The Project will be connected to the Alberta Interconnected Electric System (AIES) through a series of 240 kV transmission lines connected to the Heartland substation 12S. • A connection study is underway through the AESO connection process to determine system capacity and connection requirements. • The transmission line will be developed and permitted and is regulated by the Alberta Utilities Commission (AUC) (AUC 2024a).
Natural Gas Pipeline	• Natural gas will be supplied from the Nova Gas Transmission Ltd. (NGTL) system through a dedicated lateral operating at 250 psi (≈ 1 724 kPa), located approximately 0.5 km east of the Project. • NGTL will obtain all required permits and construct the lateral. • On-site regulation reduces pressure for distribution to each QPAC.
Water Supply	• Total data center campus water requirements are estimated at 1500 m^3/day, subject to final design. To satisfy Data Centre requirements water will be supplied via Sturgeon County's municipal system. • No process water is required for the power generation elements, 100 m^3/day will be used for ancillary uses.
Data Halls	• The data halls are currently under design. Currently, 4 separate data hall structures are planned, with a capacity rating of 200 MWe per data hall.
Ancillary Roads and Utilities	• Infrastructure within the IH-DIZ supports industrial development. • Additional internal roads, utility trenches, and service connections will be constructed as required for the Project.
Telecommunications	• Telecommunications will be provided through a wide-area fibre-optic network, serving plant operations, SCADA, data-centre connectivity, and administrative communications.

9.8 Project Activities

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

Construction

Construction of the Project is planned to occur over an approximately 24-month period, targeting commercial in-service operation in Q3 2027. The construction program has been coordinated to overlap

detailed design, equipment fabrication, and civil development so that installation milestones align with delivery of the QPAC modules.

The Project laydown yard will be within the campus project boundary, while maintaining close proximity to the power generation construction size to minimize impacted footprint and concurrent construction activities.

Data hall construction is intended to occur concurrently with other site activities.

Table 9.8.1 Construction Sequence

Phase	Schedule Window	Key Activities
Permitting & Planning	Q4 2025 – Q3 2026	Completion of regulatory submissions to the IAAC, AEPA and AUC, development permit approval from Sturgeon County, with civil, mechanical, and electrical design being undertaken. Long-lead procurement of engines, switchgear, and SCR systems begins early-2026.
Civil Works & Foundations	Q3 2026 – Q4 2026	Site clearing, grading, and drainage; installation of underground utilities, NGTL gas lateral tie-in, and pile foundations for QPAC modules and data-center structures. Construction of stormwater-retention pond and internal road network.
Module Delivery & Mechanical Installation	Q3 2026 – Q1 2027	Delivery of fully assembled QPAC modules; placement on foundations; mechanical interconnection of fuel piping, exhaust systems, and radiator banks; electrical cabling to 13.8/24.5kV distribution.
Electrical Integration & Testing	Q1 2027 – Q2 2027	Assembly of 24.5 kV bus; installation of control wiring, protection systems, and SCADA; pre-commissioning checks of electrical, fuel, and safety systems.
Commissioning & Performance Testing	Q2 2027 – Q3 2027	Sequential energization of pods and data-center halls; engine run-in testing, SCR validation, acoustic survey, and full-load performance testing under AUC/AER oversight.
Commercial Operation Date (COD)	Q3 2027	All 40 QPAC modules and data-center halls placed into continuous service. The units will run on an islanded basis until the grid connection is complete.

Sitework

The Project's construction will involve salvaging topsoil and subsoil, creating soil stockpile areas, grading operational zones and access routes to achieve level terrain, building perimeter berms, and installing all necessary infrastructure. Key activities include vegetation clearing, access road development, surface preparation, installation of major equipment, integration of process and auxiliary systems, site drainage and erosion control measures, and final site cleanup and restoration. Stripped soil will be stored on-site for use during decommissioning and abandonment.

Initial steps will consist of surveying and marking the site layout, including clearing boundaries, followed by surface preparation such as vegetation removal and soil stripping. Site preparation is expected to take about four to five months. This phase includes clearing vegetation, stripping and stockpiling topsoil, and grading the site to a predetermined elevation, which may require cutting or filling subsoil based on existing terrain. Stored soil will later be reused for reclamation. Additional preparation tasks include installing fencing,

preparing the switchyard, constructing the stormwater pond, and building access roads. Next comes foundation work, including excavation, piling, and substructure construction.

During foundation construction, duct banks, grounding grids, and underground piping will also be installed. Building construction and equipment installation will follow, covering mechanical, electrical, and switchyard facilities. Major equipment will be interconnected with piping and cabling for operation. Mechanical installation concludes with natural gas engines and their stacks, while electrical work will largely occur alongside the final mechanical stages. Commissioning will involve start-up planning, execution, management, operator training, and performance testing.

Cleanup will occur throughout construction. After completion, waste will be removed, stored soil reinstated, and areas not paved or built upon will be revegetated to meet equivalent land capability standards under the Conservation and Reclamation Regulation (Alta. Reg. 115/1993).

Power Transmission Line and Interconnection

The Project will interconnect with the provincial grid (AIES) through an AltaLink-owned and AltaLink-constructed transmission line. The interconnection will consist of a T-tap to the existing 240 kV transmission line located near the Project.

Heartland Power/Beacon has initiated a System Access Service Request (SASR) with the AESO**.** A connection study is underway and will be used by the AESO to determine transmission capacity and approve the required connection alternative. The transmission line and associated facilities will be developed, permitted, and constructed by AltaLink and regulated by the Alberta Utilities Commission (AUC 2024a).

Natural Gas Pipeline

Natural gas will be provided by a pipeline from the integrated Nova Gas Transmission Ltd. (NGTL) and ATCO Pipeline system through a dedicated lateral operating at 250 psi (≈ 1 724 kPa), approximately 0.5 km east of the Project. The pipeline route is still in development and NGTL will be responsible for obtaining applicable permits for the lateral pipeline as well as construction of the pipeline. On-site pressure regulation reduces pressure for distribution to each QPAC.

Water Supply

The total water demand for the data center campus is projected to be approximately 1,500 m^3 per day, subject to final design specifications. To meet these requirements, water will be supplied through Sturgeon County's municipal system. Notably, the power generation components of the facility will only require approximately 100 $m^3$of water daily, ensuring that water consumption is primarily for data center operations with some water consumption for domestic purposes and potable water supply.

Ancillary Roads and Utilities

Available infrastructure within the IH-DIZ is developed to support Project development, except as identified in Section 9.1 and including additional roads and utility piping required within the Project Development Area (AEP 2022; Sturgeon County 2017).

Telecommunications

Telecommunication will be required for the operation of the Project. The primary method of communication will be through a wide-area network that uses fibre-optic connections (IAAC 2024).

Operation and Maintenance

The Project will be owned by Heartland Power and operated under contract by a qualified operations and maintenance provider (Voltagrid). Day-to-day activities will be performed by a team of operators, engineers, and maintenance personnel, with additional support staff available from the operator's other Alberta facilities.

During steady-state operation the facility will maintain 100 percent availability, utilizing modular isolation to allow maintenance without overall derate. Control and monitoring will be performed from the on-site Operations Centre through redundant SCADA and fibre-optic networks linking each QPAC.

Routine maintenance will be conducted on a weekly & daily rotation with major overhauls scheduled well in advance ensuring parts and equipment availability. The Project will operate at 99.995% uptime.

During operations, the Project will follow all regulatory requirements regarding water use, wastewater management, air emissions, noise, and waste handling. Process and domestic wastewater will be routed to Sturgeon County's sanitary system, where feasible, or handled through approved alternatives if system capacity is unavailable. Air emissions will comply with applicable provincial (AENV 2005) and federal (ECCC 2017) standards, with continuous emissions monitoring where required. Noise levels will meet AUC Rule 012 limits, and routine inspections will ensure compliance. Solid and hazardous wastes will be managed under EPEA (Environmental Protection and Enhancement Act) requirements and removed by licensed contractors. Environmental monitoring and reporting will be incorporated into the facility's operational environmental management system.

Decommissioning and Abandonment

At the end of its 25-year design life Heartland Power will remove all above-grade equipment, recycle reusable metals, and remediate any hydrocarbon-containing infrastructure in accordance with the relevant environmental regulations in existence at the time of decommissioning and abandonment (AEPA 2024a; GOA 1997). A Decommissioning and Abandonment Plan, or similar, will be developed for the Project at that time. The site will remain zoned for heavy industrial use and suitable for future redevelopment (Sturgeon County 2017).

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 Heartland Power's care and control. Activities that are incidental to the Project construction and operation that would not be under Heartland Power's care and control include telecommunications, provision of power and fuel to the Project, and highway access to the Project site.

10. Estimate of the Maximum Production Capacity and Description of the Production Processes

10.1 Estimated Maximum Production Capacity

The Project is comprised of two hundred INNIO Jenbacher J624 lean-burn natural-gas engine generators, organized into VoltaGrid's Quick-deploy Power And Containerized (QPAC) modules. Each module integrates five reciprocating engines, alternators, exhaust-treatment systems, and air-cooled radiators within a single three-storey steel enclosure engineered for industrial acoustic performance and emissions compliance.

The Project's cumulative generation capacity will be approximately 920 MWe, with a nominal 800 MWe utilization.

10.2 Description of the Production Processes

1 Fuel supply and conditioning

- Sales-grade natural gas is delivered from the Nova Gas Transmission Ltd. (NGTL) system via a lateral operating at approximately 250 psi (≈ 1 724 kPa).
- Once on site, the natural gas passes through a dual-train custody-transfer station with filtration, heating and redundant pressure regulators.
- Gas pressure is reduced at the engine manifolds and distributed to each QPAC module via buried, corrosion-protected carbon-steel piping equipped with double-block-and-bleed valves, flame arrestors and automated isolation.

2 Combustion and power generation

- Within each QPAC module, five Jenbacher J624 engines combust natural gas using a microprocessor-controlled ignition system and pre-chamber lean-burn combustion to optimize the air–fuel ratio and minimize NO_x formation.
- The engines convert fuel energy to mechanical output that drives 24.5 kV synchronous generators.
- Typical individual engine output is 4.6 MWe, resulting in approximately 920 MWe across 200 engines.

3 Exhaust treatment

- Engine exhaust flows to the upper deck of each QPAC module, where it passes through Selective Catalytic Reduction (SCR) systems achieving approximately 95 % NO_x removal from the combustion exhaust.
- Treated exhaust is released to atmosphere through the exhaust system on the upper level of each QPAC module.

4 Cooling and thermal management

- Engine jacket-water and charge-air heat are removed via closed-loop glycol circuits connected to air-cooled radiator arrays.
- No process water is used for cooling, and the plant does not include cooling-tower blowdown or an HRSG steam cycle.
- Total thermal rejection at full output is approximately 1 060 MW(th), dissipated via the radiator and heat exchanger loops.

5 Electrical distribution and onsite microgrid supply

- Electrical power is generated at 13.8 kV, 60 Hz and transformed to 24.5KV, collected within each QPAC module through local switchgear located at generation perimeter edge.
- Ten QPAC modules form one GGP. Each GGP includes a 24.5kV collector bus, pod-level protection and local control; the system can operate in islanded mode where required.
- The four GGPs are interconnected by a 24.5kV-bus with sectionalizing breakers, forming a resilient internal microgrid with multiple supply paths to the data-centre halls.
- Power is delivered to the on-site, co-located data-centre campus using data center e-houses, step-down transformers, Uninterruptible Power Supply (UPS) systems, and automatic transfer switches (ATS) within the data centres.

11. Project Schedule

The anticipated Project schedule is presented in Table 11.1.1.

Table 11.1.1 Project Schedule

Project Phase	Schedule
Permitting & Design Work	Q1 2025 – Q3 2026
Civil Works & Foundations	Q3 2026 – Q3 2026
Module Delivery & Mechanical Installation	Q3 2026 – Q2 2027
Electrical Integration & Testing	Q1 2027 – Q2 2027
Commissioning & Performance Testing – Site Wide	Q2 2027 – Q3 2027
Commercial Operation Date (COD)	Q3 2027
Project decommissioning and abandonment (after estimated 25-year life)	2050-2055

If IAAC determines that a federal IA is required, the schedule would be extended by approximately two years, with an estimate in service date in 2030 Q3 (IAAC 2024).

12. Potential Alternatives

12.1 Alternative Means of Carrying Out the Project

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

- Facility siting;
- Alternatives to meet Project cooling duties – water versus air; and
- Selection of gas-fired lean-burn reciprocating engine power generation technology – configuration and sizing.

Facility Siting

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

interconnections. The selected site is located on a privately owned parcel within the Heartland Industrial Zone (IH-DIZ), designated I5 – Heavy Industrial District (Sturgeon County 2017).

The layout of the Project has been developed to maximize compatibility with adjacent industrial uses and to limit land disturbance to an area already zoned and planned for heavy industrial development. Project development is contained within a single industrial parcel and does not require clearing of undisturbed lands beyond the existing boundaries. The site layout also incorporates internal circulation routes that allow maintenance and emergency access without requiring new external roads.

Cooling

Traditional water-based cooling systems circulate large volumes of water through heat exchangers to absorb heat from equipment. The warmed water is typically directed to a cooling tower, where evaporation removes heat before the cooled water is recirculated. While effective, this approach requires significant water consumption, ongoing treatment to prevent scaling and biological growth, and infrastructure for cooling towers and make-up water supply.

In contrast, the selected technology for the Project uses a closed-loop glycol cooling system paired with air-cooled radiators. Glycol-based coolant circulates in serviceable yet sealed loop, transferring heat from process equipment to air-cooled radiators. Ambient air is blown across the radiator surfaces to dissipate heat, eliminating the need for evaporative cooling and large water volumes. This design minimizes water use, reduces environmental impact, and enhances reliability by preventing contamination and scaling. Additionally, the closed-loop system simplifies maintenance and supports consistent thermal performance without reliance on external water sources.

12.2 Alternatives to The Project

Currently there are no technically and economically feasible alternatives to the Project that generate up to 920 MWe of reliable baseload electricity for data centers.

PART C: Location Information

13. Description of the Proposed Location

13.1 Geographic Coordinates

The Project will be situated on the lands privately owned/ controlled by Heartland Power located at NW & SW Quarters of Section 15-56-22-4 W4M (Heartland Power land) located 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 Sturgeon River is approximately 4 km southwest of the Project, which is located 7 km east of Gibbons. The nearest park is the Northwest of Bruderheim Natural Area which is located 13 km to the northeast 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 shown in Figure 1.1.1. The conceptual site map layout is provided in Figure 9.1.1 Site Plan.

13.3 Legal Description of Land

The Project is located approximately 7 km east of Gibbons Alberta, immediately north-northeast of the Junction of Secondary Highway 643 and Range Road 223, as shown in Figure 1.1.1.

The Project is in Alberta's Sturgeon County Industrial Heartland – Designated Industrial Zone (IH-DIZ), on privately owned land (Sturgeon County 2017; Government of Alberta 2014).

- Legal land description: NW and SW Quarter of Section 15-56-22-W4M
- Deg-Min-Sec Latitude and longitude coordinates: 53°50'23"N, 113°11'34"W
- Decimal Latitude and longitude coordinates: 53.84032, -113.192246

13.4 Permanent, Seasonal or Temporary Residences and to The Nearest Affected Communities

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 is only one residence within 1.5 km of the Project, located approximately 200 metre (m) north. The City of Fort Saskatchewan is approximately 7 km south of the Project and the Town of Gibbons is located 7 km to the west.

13.5 Proximity to Land Used for Traditional Purposes

The Project is located in Treaty 6 territory. Proximity to Indigenous groups and organizations is shown in Figure 4.1.1, based on the Landscape Analysis Indigenous Relations Tool (LAIRT) and the IAAC directory (IAAC 2024).

Table 13.5.1 summarizes the distances of First Nations Reserves and Métis settlements that are within 150 km of the Project.

Table 13.5.1 First Nation Reserves and Métis Settlements Distance from the Project

Peoples	Distance (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

Special Note:

As the Project is located on private land and within an area zoned for industrial development, the Project area is not used for Indigenous harvesting or other traditional practices.

13.6 Proximity To Federal Land

The Project will be located on privately owned land and will not overlap any federally owned land (IAAC 2024) (see Figure 4.1.1).

The nearest federally owned lands to the Project include the Redwater Department of Defense Military Base (approximately 15 km northeast), Elk Island National Park (approximately 22 km to the southeast) and the 3rd Canadian Division Support Base Edmonton (commonly referred to as Edmonton Garrison) (approximately 24 km west of the Project).

14. Physical and Biological Environment

The information below was compiled and delivered by Montrose Environmental Solutions Canada (Montrose) and Stantec.

14.1 Project Environmental Setting

The Project is situated in the North Saskatchewan Region of central Alberta (the region), on private land within Sturgeon County in Alberta's White Area. Three regional planning areas lie adjacent to the Project: Upper Athabasca and Lower Athabasca to the north, and the Red Deer planning region to the south. Banff National Park forms part of the region's western boundary, while the City of Edmonton is located near its center. The region features diverse landscapes, including the Rocky Mountains and foothills in the west, prairie parkland and grasslands to the east, and boreal forest to the north. Key regional activities include agriculture, oil and gas development, recreation, and tourism (GOA 2014).

Surrounding quarter sections are primarily agricultural, consisting of cultivated land and wooded areas dominated by deciduous species. The Sturgeon Refinery Process Delivery facility is located approximately 3.3 km east of the Project (Figure 1.1.1). The nearest named waterbody, Lostpoint Lake, lies about 6 km northwest. Several wetlands and small waterbodies occur within the Project footprint and the terrestrial assessment area (TAA). The TAA is defined as a 100 m buffer around the proposed Project footprint and is used to assess soil, terrain, vegetation, and wetland conditions.

The site's topography slopes from southwest to northeast. Surface runoff from the southwest generally flows toward the northeast, exiting through a ditch at the site's northeast boundary. Some runoff from the southeast drains out through the southeast corner.

The Project lies within the Dry Mixedwood subregion of Alberta's Boreal natural region, characterized by undulating plains, aspen-dominated forests, and fens (Natural Regions Committee 2006). Water covers roughly 3% of this subregion (excluding Lesser Slave Lake). Major rivers draining north to the Mackenzie system include the Peace, Smoky, and Athabasca Rivers, while the North Saskatchewan River flows east toward the Saskatchewan River drainage (Natural Regions Committee 2006). Numerous small, shallow lakes occur throughout the subregion, and wetlands cover about 15%, with organic deposits underlying 10% and shallow peats or wet mineral soils underlying the remaining 5% (Natural Regions Committee 2006).

Designated environmentally significant areas (ESAs) in the Wildlife Assessment Area (WAA) were determined through a review of publicly available information and the Environmentally Significant Areas in Alberta: 2014 Update Final Report (Fiera 2014). The ESAs represent places in Alberta that are important to "the long term maintenance of biological diversity, physical landscape features, and/or other natural processes, both locally and within a larger spatial context" (Fiera 2014). The ESAs are an amalgamation of environmental datasets; indicators within each dataset are ranked based on multi discipline criteria and presented at a quarter section resolution. ESAs are not protected by legislation; they are a tool for environmental planning through identification of potentially sensitive areas. The primary intended use of the ESA dataset is to inform land use and watershed planning for those areas identified as having high environmental significance (Fiera 2014). Certain attributes of ESAs may be protected by legislation. There are no ESAs within the Project footprint. The nearest ESA is 2.4 km north of the Project.

The mean temperature of the warmest months (July/August) is 15.9°C, while the coldest months (December/January) average -16.8°C (Natural Regions Committee 2006). Mean annual precipitation is approximately 460 mm, with about 70% falling between April and August. Peak precipitation occurs in June and July, often associated with intense convective storms (Natural Regions Committee 2006).

The proposed Project site consists of cultivated agricultural land, with wooded (deciduous dominated) areas on the northern quarter section. Light Detection and Ranging (LiDAR) data and contour analysis confirm that the site's topography slopes from southwest to northeast (Montrose 2025).

14.2 Air Quality

The Project is located approximately 7 km east of Gibbons, Alberta within Sturgeon County. It is situated in the Industrial Heartland Designated Industrial Zone (IH-DIZ), where multiple industrial facilities operate in proximity.

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. HAMP operates 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. According to the 2023 HAMP annual air-quality report, most air-monitoring stations recorded air quality in the "good" or "low-risk" range for the majority of the year (FAP 2024a).

The 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. Excluding wildfire smoke and short duration inversion events, 83.4% of hours were in the low-risk range, 12.8% in the moderate range, and 3.8% in the high-risk range (FAP 2024a). High-risk values were almost entirely associated with unprecedented concentrations of fine particulate matter ($PM_{2.5}$) from 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 (Stantec 2025). The Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022a) prescribes the representative monitoring stations in the IH-DIZ for the determination of baseline concentrations. The prescribed ambient air quality monitoring station for nitrogen dioxide (NO_2) and fine particulate matter ($PM_{2.5}$) is the Gibbons station and for carbon monoxide (CO) is the Fort Saskatchewan station which are part of the HAMP/FAP.

Continuous ambient NO_2 and $PM_{2.5}$ monitoring data from the Gibbons station and CO from the Fort Saskatchewan station were obtained from the AEPA Data Management Platform (AEPA 2025a). The data representing the most recent three years (2022 to 2024) with a complete data record were analyzed in accordance with the AQMG (Alberta Air Quality Modelling Guideline) (AEP 2021a) and the background ambient concentrations were determined. For $PM_{2.5}$, the data from 2021 to 2023 was used after removing data influenced by 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 14.2.1 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 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. Please refer to Appendix B – Air Quality Assessment for further details.

Table 14.2.1 Baseline Air Quality Concentrations

Substance	Averaging Period	Ambient Background Concentration [a b] (µg/m³)	AAAQO/G (µg/m³)	Percentage of Applicable AAAQO/G
NO_2	1-hour	31.9	300	10.6
	Annual	9.8	45	21.8
$PM_{2.5}$ [c]	1-hour	17.2	80	21.5
	24-hour	16.7	29	57.7
CO	1-hour	380	15,000	2.5
	8-hour	379	6,000	6.3

Source: AEPA Data Management Platform (AEPA 2025a)

Notes:

For 1-hour averaging period, the 90th percentile value from the cumulative frequency distribution of the background monitoring data is calculated for each year. For 24-hour and annual averaging period, the average value is calculated from the reduced dataset (after removing values greater than the 90th percentile) for each year.[b] The background concentrations are calculated as the 3-year average, as per the AQMG.

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

14.3 Acoustic Environment

Environmental noise from regulated facilities within the IH-DIZ must comply with AER Directive 038: Noise Control (AER 2024) and AUC Rule 012: Noise Control (AUC 2024b), while also considering the Northeast Capital Industrial Association (NCIA) Regional Noise Management Plan (RNMP). The RNMP provides a coordinated regional framework for managing environmental noise from industrial activities and is the collective mechanism used by NCIA member companies to demonstrate compliance with AER and AUC noise requirements. The AUC, AER, and NCIA have jointly established Project-Specific Sound Levels (PSLs) for noise receptors within the IH-DIZ.

As required under AUC Rule 007, a Noise Impact Assessment (NIA) was completed for the Project following the methodology in AUC Rule 012 (AUC 2024b) by Stantec. The NIA evaluates the Baseline Case, Project Case, Application Case, and Foreseeable Application Case sound levels:

- Project Case: noise contribution from the Project alone.
- Application Case: cumulative noise from the Baseline Case + Project Case.
- Foreseeable Application Case: cumulative noise from the Baseline Case + Project Case + the proposed Greenlight Electricity Centre, which is currently before the AUC (AUC Application 30261-A001).

Cumulative sound levels for both the Application Case and Foreseeable Application Case meet the applicable daytime and nighttime PSLs.

Low-frequency noise (LFN) was assessed using the procedures in AUC Rule 012, and LFN effects are not expected at any receptor.

The NIA concludes that the Project is compliant with all requirements of AUC Rule 012.

See Appendix C – Noise Impact Assessment for further details.

14.4 Geology and Hydrogeology

Montrose Environmental Solutions Canada (Montrose) conducted a desktop geology and hydrogeology assessment for the Project. An assessment area was defined as a 5 km radius surrounding the Project footprint boundary. The following sections provide geological and hydrogeological information for the assessment area. Data sources for the geological and hydrogeological information include reports and maps from the Alberta Geological Survey, technical publications, and local water well records within the assessment area pulled from the Government of Alberta's water well information database (GOA, 2025).

Physiography and Topography

The topography of the assessment area is undulating with elevations ranging from approximately 640 to 660 m above sea level (asl). The topography slopes east-southeast towards the North Saskatchewan River, located approximately 7 km east-southeast from the Project area, at a minimum elevation of 600 m asl.

Surficial Geology

The surficial geology is characterized as Pleistocene-aged eolian deposits and stagnant ice moraine sediments primarily comprised of till consisting of an unsorted mixture of clay, silt, and sand, with local water-sorted material (Shetsen 1990). Drift thickness in the assessment area ranges from 10 to 20 m, increasing eastward towards the Beverly Valley, a buried bedrock valley parallel to and east of the North Saskatchewan River (Andriashek 1988). The northwest-southeast trending Sturgeon Valley is located to the southwest of the assessment area and is a glacial meltwater channel that feeds into the present-day North Saskatchewan River Valley/Beverly Valley.

Regional mapping of the drift packages has been completed, and the Project area is interpreted to overlie two stratigraphic units; the Cooking Lake Till and the overlying Glacial Lake Edmonton Sediments and post glacial fluvial and eolian sediments (Andriashek 1988). The Cooking Lake Till is described as ranging from sandy clay to clayey sand and is approximately 10 to 15 m thick (Andriashek 1988). The Glacial Lake Edmonton Sediments and post glacial fluvial and eolian sediments are interpreted to be less than 5m in thickness and are primarily comprised of eolian sand (Andriashek 1988). Towards the north and west of the Project area, the aeolian deposits contribute to longitudinal and parabolic dunes.

The local lithology is consistent with Groundwater Information Centre (GIC) water well records at five well locations (Well ID: 264237, 264223, 266035, 264460 and 1755004) within 1 km of the Project area. The borehole lithology logs indicate the presence of shallow units comprised of till, clay, sandy clay and sand of varying thickness. Drift thickness at these wells ranged from 1.52 to 33.53 m.

Bedrock Geology

The primary bedrock unit at and surrounding the Project area is the Belly River Group (Bedrock Geology of Alberta, 2013). The Belly River Group is a late-Cretaceous aged, marginal marine to non-marine unit comprised of grey to greenish grey, thick bedded, feldspathic sandstone, grey clayey siltstone, grey and green mudstone and ironstone beds (Stein 1976). The lower portions of the Belly River Group contain several sandstone units which can be separated by shale intervals (Stein 1976). The regional bedrock geology is consistent with borehole logs associated to GIC water well records at five well locations (Well ID: 264237, 264223, 266035, 264460 and 1755004) within 1 km of the Project area. The borehole logs describe the bedrock geology to be comprised of several sandstone and shale intervals and in some instances siltstone.

Regionally, the bedrock topography slopes east-southeast towards the North Saskatchewan River and ranges from approximately 650 m above sea level (asl) west of the Project area to 600 m asl at the North Saskatchewan River (Atkinson et al. 2020a, 2020b). Bedrock is anticipated at depths ranging between 10 and 20 m below ground surface (bgs), as per the approximate drift thickness (Andriashek 1988). The regional bedrock depth is generally consistent with GIC water well records at two well locations (Well ID: 264237, and 1755004) within 1 km of the Project area. The depth to bedrock at these locations was observed to be 9.14 and 10.67 m bgs, respectively. The remaining three well records (Well ID: 264223, 266035, and 264460) within 1 km of the Project area encountered bedrock at 1.52, 5.49 and 33.53 m bgs, respectively.

Hydrogeology

Based on the description of the regional surficial geology, sand or gravel lenses within the till may have sufficient permeability to transmit groundwater at a local scale; however, based on the lack of wells completed within these sands and gravels (Appendix D), they are not interpreted to be regional aquifers. More extensive sand and gravel aquifers are likely present within the Sturgeon and Beverly Valleys (e.g., the Empress Formation sands (Andriashek 1988); however, they are outside the assessment area and are not interpreted to be affected by Project operations.

Lateral groundwater flow in surficial aquifers is typically driven by ground surface topography, flowing from elevation highs to lows. Vertical groundwater flow is influenced by variations in permeability and is interpreted to be mostly downwards. In the absence of site-specific groundwater data, and based on topography, the interpreted flow direction of shallow groundwater is to the east-southeast towards the North Saskatchewan River.

Groundwater is interpreted to travel through the sand and gravel lenses within the surficial tills, and diffuse throughout the till. A portion of the groundwater will continue to move downwards until reaching the bedrock, particularly the sandstone units within the Belly River Group, which act as bedrock aquifers. Similar to shallow groundwater, regional groundwater flow within the bedrock aquifers is interpreted to be to the east-southeast towards the North Saskatchewan River, as it is a major erosional and drainage feature of the area.

Reported concentrations of total dissolved solids within the Belly River Group range from 620-2,000 mg/L (Andriashek 1988; Barker et al. 2013). The groundwater chemistry is anticipated to have concentrations of calcium and magnesium above 100 mg/L and below 20 mg/L, respectively, as well as sodium and potassium concentrations below 400 mg/L and between 4-5 mg/L, respectively. Both chloride and sulfate concentrations are anticipated to be below 200 mg/L (Barker et al. 2013).

Local Groundwater Users

GIC water well records within 5 km of the Project were identified by searching the Government of Alberta's water well information database (GOA 2025). Water well records presented herein have not been field verified and the reported well locations are often only accurate to the centre location of the reported legal site description or quarter section.

A hydrostratigraphic completion unit for each GIC well record was interpreted by determining the base of the screen using the lowest reported completion depth (i.e., perforation interval, screen interval, or total depth of the well). If the completion interval was deeper than the reported depth to bedrock, then the well record was interpreted to be completed within bedrock. If the completion interval was shallower than the reported depth to bedrock, then the well record was interpreted to be completed within the surficial units. A total of 212 water well records were identified and are summarized in Appendix D and shown on Figure 14.4.1.

All well records are reported to have a total depth of less than 110 m (Appendix D). A total of 106 well records are interpreted to be completed within bedrock aquifers, three are interpreted to be completed in the

surficial units, and two are interpreted to be completed between both the bedrock and surficial units. The remaining 101 well records did not report a depth to bedrock and therefore, the completion unit could not be interpreted. Depth to the top of screen ranges from 19.51 to 67.06 m bgs, and the depth to the top of perforation ranges from 4.57 to 86.87 m bgs. Depth-to-water measurements range from <1 to 38.1 m bgs.

Of the 212 well records, the type of work is distributed as follows:

- 144 New Well;
- 62 Chemistry;
- 3 Federal Well Survey;
- 2 Deepened;
- 1 Well Inventory;

Of the 212 well records, the proposed use for the well is distributed as follows:

- 120 Domestic;
- 48 Domestic and Stock;
- 26 Stock;
- 16 Unknown;
- 1 Industrial; and
- 1 Monitoring.

A search was also completed for active groundwater or surface water diversion licenses within 5 km of the Project. A total of seven (7) active groundwater licenses and four (4) surface water licenses were identified (Appendix D, GOA 2025). Groundwater licenses are for diversion from unnamed aquifers and an unnamed stream for the purposes of stockwatering, parks and recreation/campgrounds, and upstream hydrostatic testing and pipeline construction and operation. Of the four (4) surface water licenses, diversions are from a dugout, a tributary to the North Saskatchewan River, and surface runoff for the purposes of private irrigation, public roads, civil infrastructure and telecommunication, and petrochemical, chemical and fertilizer plants.

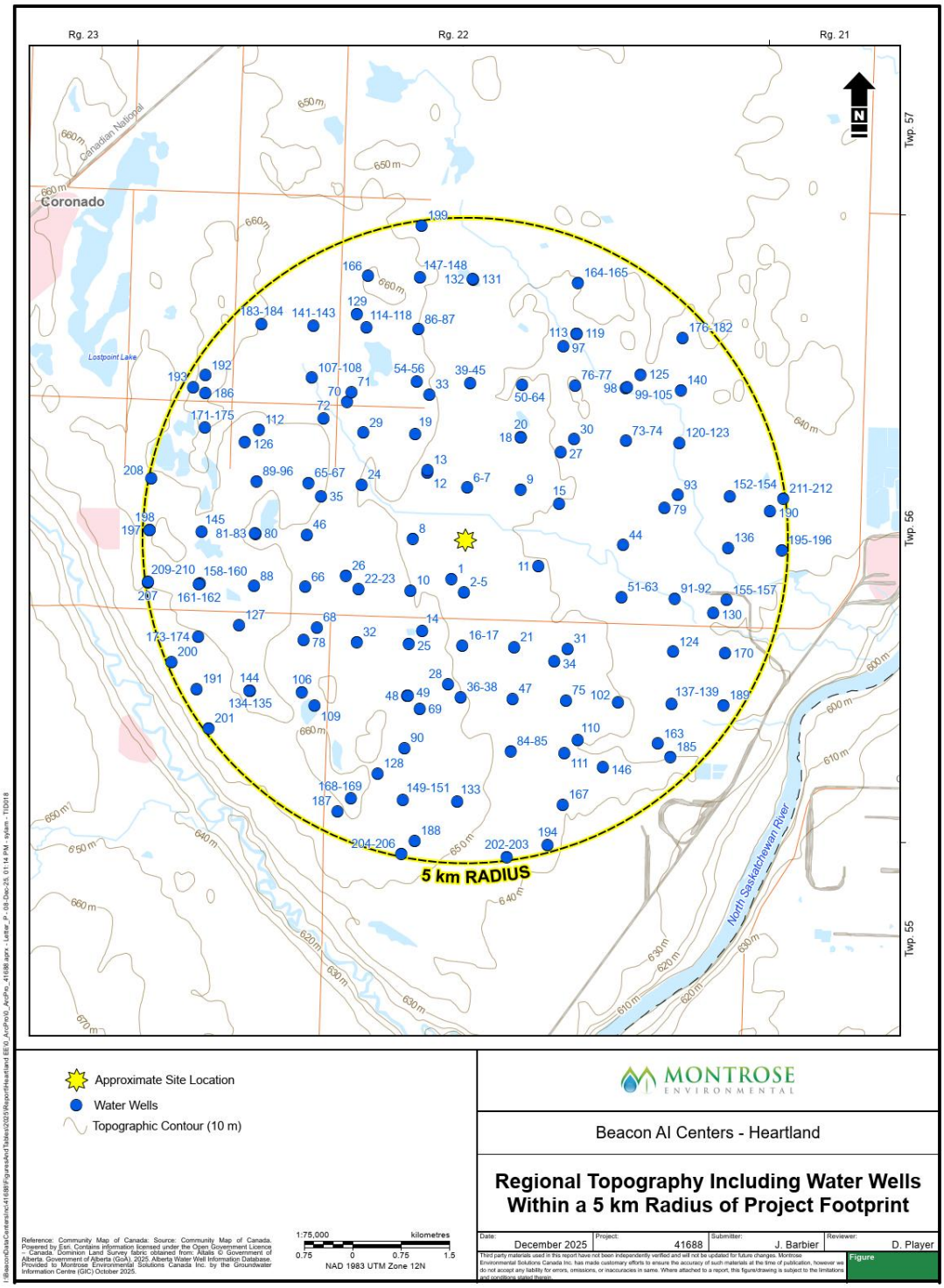

Figure 14.4.1 Regional Topography Including Water Wells Within a 5 KM Radius of Project Footprint

14.5 Surface Water and Fish and Fish Habitat

The Project site is located within the North Saskatchewan River watershed, within the Above Beaverhill River sub-watershed. Waterbody data for the study area and surrounding region was obtained using the Alberta Environment and Protected Area (AEPA) Fish and Wildlife Internet Mapping Tool (FWIMT) (GOA 2025). Watercourses and water bodies in this assessment are discussed using the waterbody mapped name (if available) and their waterbody identification number as denoted in FWIMT. Within the FWIMT database, the study area intersects with two unnamed tributaries of the North Saskatchewan River (tributaries identified as Waterbody ID 41456 and Waterbody ID 21989). Historical fish capture data was available for Waterbody 21989; however, no data were available for the other tributary.

The following named watercourses are either located within 5 km of the Project area, or downstream of tributaries contained within the study area.

- North Saskatchewan River (waterbody ID 2162) located 5.9 km to the east. Identified as a Class C waterbody with a restricted access period (RAP) from April 16 to July 31 on the St. Paul Management Area Water Act Code of Practice (COP) Map.
- Sturgeon River (waterbody ID 2236) located 4.9 km southwest. Identified as a Class C waterbody with a RAP from April 16 to June 30 on the St. Paul Management Area Water Act COP Map.
- The following unnamed tributaries of the North Saskatchewan River are located within 5km of the Project area. All of these watercourses share the same RAP as the North Saskatchewan River (i.e., April 16 to July 31):
  - Two unnamed tributaries located to the north: Waterbody ID 21990 (3.5 km), and Waterbody ID 41409 (4.9km);
  - Two unnamed tributaries located to the southeast: Waterbody ID 41524 (3.6 km) and Waterbody ID 25433 (3.3 km); and
  - One unnamed tributary located to the south: Waterbody ID 41751 (4.1 km).
- Five unnamed tributaries of the Sturgeon River are located within 5 km of the Project area. All watercourses share the same RAP as the Sturgeon River (i.e. April 16 to June 30):
  - Three unnamed tributaries located to the southwest: Waterbody ID 41689 (3.6 km), Waterbody ID 41659 (3.7 km), and Waterbody ID 41699 (4.1 km); and
  - Two unnamed tributaries located to the west: Waterbody ID 41577 (4.1 km), and Waterbody 41487 (4.5 km).
- A review of historical fish presence was conducted for watercourses surrounding the Project area using FWIMT and Fisheries and Oceans Canada's (DFO) aquatic species at risk map (DFO 2025). The search area included:
  - The North Saskatchewan River 10 km upstream and downstream of the section of the river closest to the Project area;
  - The Sturgeon River 10 km upstream of the confluence with the North Saskatchewan River; and
  - The five unnamed tributaries of the North Saskatchewan River within 5 km of the Project area and the five unnamed tributaries of the Sturgeon River within 5 km of the Project area.

Species present in the search area are listed in Table 14.5.1 Thirteen large bodied fish were identified of which 8 were considered sport fish. Ten small bodied fish were identified.

Lake sturgeon (Acipenser fulvescens) was the only species listed as threatened, specifically under the Alberta Wildlife Act (GOA 1997) and the Alberta Endangered Species Conservation Committee (GOA 2024). Lake sturgeon are known to inhabit the North Saskatchewan River.

None of the watercourses in the search area (whether named or unnamed) were mapped as critical habitat according to federal species at risk maps (DFO 2025). It is not expected that aquatic species at risk inhabit the Project area or nearby tributaries.

The Above Beaverhill sub-watershed of the North Saskatchewan River is a “yellow zone” for whirling disease risk, which 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).

Table 14.5.1 Historical Fish Presence Documented Near the Project

Family	Common Name	Scientific Name	Large/Small Bodied?		Sportfish?	SARA (Federal)a	Wildlife Act (Provincial)b
Acipenseridae	lake sturgeon	Acipenser fulvescens	Large		Yes	No status	Threatened
Catostomidae	longnose sucker	Catostomus catostomus	Large		No	No status	Not listed
	shorthead redhorse	Moxostoma macrolepidotum	Large		No	No status	Not listed
	white sucker	Catostomus commersonii	Large		No	No status	Not listed
	quillback	Carpiodes cyprinus	Large		No	No status	Not listed
	silver redhorse	Moxostoma anisurum	Large		No	No status	Not listed
Cottidae	spoonhead sculpin	Cottus ricei	Small		No	No status	Not listed
Esocidae	northern pike	Esox lucius	Large		Yes	No status	Not listed
Gadidae	burbot	Lota lota	Large		Yes	No status	Not listed
Gasterosteidae	brook stickleback	Culaea inconstans	Small		No	No status	Not listed
Hiodontidae	goldeye	Hiodon alosoides	Large		Yes	No status	Not listed
	mooneye	Hiodon tergius	Large		Yes	No status	Not listed
Leuciscidae	emerald shiner	Notropis atherinoides	Small		No	No status	Not listed
	fathead minnow	Pimephales promelas	Small		No	No status	Not listed
	longnose dace	Rhinichthys cataractae	Small		No	No status	Not listed
	river shiner	Alburnops blennius	Small		No	No status	Not listed
	spottail shiner	Hudsonius hudsonius	Small		No	No status	Not listed
	northern redbelly dace	Chrosomus eos	Small		No	No status	Not listed
	Northern pearl dace	Margariscus nachtriebi	Small		No	No status	Not listed

Percidae	walleye	Sander vitreus	Large		Yes	No status	Not listed
	sauger	Sander canadensis	Large		Yes	No status	Not listed
Percopsidae	trout-perch	Percopsis omiscomaycus	Small		No	No status	Not listed
Salmonidae	mountain whitefish	Prosopium williamsoni	Large		Yes	No status	Not listed

Notes:

a. Species at Risk Act (GOC 2025)
b. Alberta Wildlife Act – Wildlife Regulation (GOA 1997)

14.6 Soils

The Project will be located on land under annual cultivation and is within Soil Correlation Area 10. The purpose of the soil and terrain assessment is to identify soil classification and distribution information and soil suitability for reclamation. The soil survey information collected for the Project will be used to outline conservation and reclamation (C&R) practices, including soil salvage requirements.

Methods

A soil and terrain survey was conducted within the TAA on September 30 and October 1, 2025. Soil inspections were completed with a shovel and hand-held Dutch auger to a maximum depth of 100 cm. Twenty-two soil inspections were completed within the Project footprint. Soil and terrain at each inspection site were described and classified according to the Canadian System of Soil Classification (SCWG 1998) and assigned a soil series name from the Alberta Soil Names File (Bock 2016) based on the soil subgroup and parent material classification.

Soil samples from each horizon were collected from 12 soil inspection sites (Appendix D) and submitted for physical and chemical analyses including particle size and texture, pH, electrical conductivity (EC), sodium adsorption ratio (SAR), saturation percent, soluble ions, total organic carbon and calcium carbonate equivalence.

- *Soil physical and chemical analyses were used to determine the following soil quality ratings for the TAA:*
- *land suitability for agricultural crops according to the Land Suitability Rating System for Agricultural Crops 1. Spring-seeded small grains (Agronomic Interpretations Working Group 1995).*
- *reclamation suitability for the Plains Region according to Soil Quality Criteria Relative to Disturbance and Reclamation (AAFRD 2004).*
- *wind erosion risk according to Wind Erosion Risk – Alberta (Coote and Pettapiece 1989).*
- *water erosion risk according to Water Erosion Risk – Alberta (Tajek and Coote 1993).*

Soil map units (SMUs) were delineated within the TAA by reviewing aerial imagery, LiDAR, wetland mapping and extrapolating soil inspection information collected within the Project footprint. Development of simple SMUs followed the soil mapping convention identified in A Soil Survey Handbook (Coen 1987). Each SMU consists of a dominant soil series occupying at least 80% of the map unit area and a SMU code identifying inclusions within the SMU. For example, a SMU with a dominant soil series Beaverhills (BVH) and -1 code would be assigned BVH-1 as per the following Table 14.6.1.

Table 14.6.1 Soil Map Unit Code Description

Soil Map Unit Code	Land Suitability for Agriculture
-1	Dominant soil series occupies ≥ 80% of the map unit. Inclusions within the map unit (≤20%) are Gleyed and/or Calcareous Black Chernozems.

-2	Dominant soil series occupies ≥ 80% of the map unit. Inclusions within the map unit include ≤10% Black Chernozems of till and/or GLLC parent material, and ≤10% gleyed or calcareous Black Chernozems.

Land Suitability for Agriculture Crops

The Land Suitability Rating (LSR) System for Agricultural Crops (Agronomic Interpretations Working Group 1995) was used to determine the suitability of soil for agricultural use. The LSR System uses a base rating, assessed on soil moisture, soil nutrient regimes, and applies deductions for the most limiting soil physical and chemical properties (Table 14.6.2). Subclasses are then assigned to identify specific limiting factors (Agronomic Interpretations Working Group 1995).

Table 14.6.2 Land Suitability Rating System Classes

Suitability Class	Index Points	Limitations	Description
1	80-100	None to slight	Land has no significant limitations for production of the specified crops.
2	60-79	Slight	Land in this class has slight limitations that may restrict the growth of the specified crops or require modified management practices.
3	45-59	Moderate	Land has moderate limitations that restrict the growth of the specified crops or require special management practices.
4	30-44	Severe	Land in this class has severe limitations that restrict the growth of the specified crops or require special management practices or both. This class is marginal for sustained production of the specified crops.
5	20-29	Very severe	Land in this class has very severe limitations for sustained production of the specified crops. Annual cultivation using common cropping practices is not recommended.
6	10-19	Extremely severe	Land in this class has extremely sever limitations for sustained production of the specified crops. Annual cultivation is not recommended even on an occasional basis.
7	0-9	Unsuitable	Land in this class is not suitable to produce specified crops.
Source: Adapted from Agronomic Interpretations Working Group 1995			

The classification system is used to determine the suitability of land for the production of spring-seeded small grains. The final rating is determined by combining the individual soil, landscape and climate deductions into one final rating. The limitations are based on the predicted effects on sustained production of crops.

Soil Suitability for Reclamation

The surface and subsurface material for mineral soils in the TAA were rated for their reclamation suitability according to Soil Quality Relative to Disturbance and Reclamation for the Plains Region (AAFRD 2004). The criteria rate the overall reclamation suitability by interpreting the physical and chemical properties of the topsoil and subsoil horizons for various soil types. Topsoil and subsoil lifts were rated according to their degree of suitability for plant growth. The most limiting rating was used to determine the overall suitability rating. The four reclamation suitability classes are presented in Table 14.6.3. Criteria for evaluating the suitability of surface and subsurface soil for reclamation purposes in the Plains Region are found in the Soil Quality Relative to Disturbance and Reclamation for the Plains Region (Region (AAFRD 2004).

Table 14.6.3 Reclamation Suitability Classes

Reclamation Suitability Class	Reclamation Suitability Description
Good	None to slight limitations that affect use as a reclamation medium.
Fair	Moderate soil limitations that affect reclamation but that can be overcome by proper planning and good soil management.
Poor	Severe soil limitations that make reclamation more challenging. These soils can be used for reclamation but require proper planning and very good soil management.
Unsuitable	Chemical or physical properties of the soils are so severe that reclamation might not be economically feasible or in some cases impossible.
Source: Adapted from Alberta Agriculture (AAFRD 2004)	

Soil Sensitivity to Wind Erosion

Rating of sensitivity to wind erosion is derived through an equation that accounts for the surface roughness and aggregation, soil resistance to movement, drag velocity of surface wind, soil moisture, shear resistance, and available moisture of the soil surface (Coote and Pettapiece 1989). The resulting ratings are based on soil under agricultural production with no cover. Soils with a sandy texture are more susceptible to wind erosion than those with a clay texture. The wind erosion risk classes are presented in Table 14.6.4.

Table 14.6.4 Wind Erosion Risk Classes

Wind Erosion Risk Classes	Soil Texture
High	Very fine sand, sand, coarse sand, loamy sand, gravely sand, dry humic organic materials
Moderate	Sandy loam, fine sandy loam, loam, silt loam, sandy clay loam, sandy clay, mesic organic material
Low	Silt, silty clay loam, clay loam, silty clay, clay, heavy clay, fibric organic material
Adapted from Coote and Pettapiece (1989).	

Soil Sensitivity to Water Erosion

Water erosion risk is estimated through an equation that accounts for erosivity for rainfall and snowmelt, soil erodibility, slope length and steepness, crop cover and management, and conservation practices (Tajek and Coote 1993). Erosivity for rainfall and snowmelt (R) has been estimated for various parts of the province. Slope length is considered a topographical expression because very long slopes may increase erosion risk of fine-grained materials just as steep slopes also increase erosion potential. Soil erodibility (K factor) and length-slope (LS factor) have been estimated for various topographical expressions and slope length. The rating system used to evaluate soils is based on the approximate R, K, LS values presented by both LCRC (Land Conservation and Reclamation Council) et al. (1993) and Tajek and Coote (1993) for various soil textures, slopes, and length of slopes found in each soil map unit. Medium textured soils (loam to silty loam) have a K factor of approximately 0.030 to 0.036. More sandy soils have a K factor of 0.015. The system used to rate erosion risk on the Project footprint is presented in Table 14.6.5.

Table14.6.5 Water Erosion Risk Classes

Water Erosion Risk Classes	Slope Class	Slope Percent (%)	Slope Length (m)	LS Factor	K Factor
Low	1 to 3	<5	0 to 500	0.5 to 0.8	0.015 to 0.036
Moderate	4	5 to 9	50 to 500	0.8 to 2.2	0.015 to 0.036
High	5+	9+	50 to 500	2.2 to 3.5	0.015 to 0.036

Adapted from Tajek and Coote (1993) and LCRC et al. (1993) for Chernozemic soils.

Results

The TAA is in Soil Correlation Area (SCA) 10 (Bock 2016) and located on Orthic Black Chernozems of the Beaverhills (BVH) and Peace Hills (PHS) soil series and undifferentiated Gleysols (ZGW), as well as disturbed soils (Figure 14.6.1). The Beaverhills soil series is developed on moderately fine till parent material within an undulating landscape with slope gradients less than or equal to 5%. The Peace Hills soil series is developed on moderately coarse glacialfluvial parent material within an undulating landscape with slope gradients less than

or equal to 5%. Anthropogenic effects on these soils include annual cultivation. Disturbed soils within the TAA are associated with an existing farm residence and are located in the southwest of the TAA.

Three (3) soil map units were delineated within the TAA (Figure 14.6.1), and their site-specific properties are summarized in Table 14.6.6 below. Existing vegetation in the TAA is described under the pre-disturbance setting and vegetation and wetlands sections.

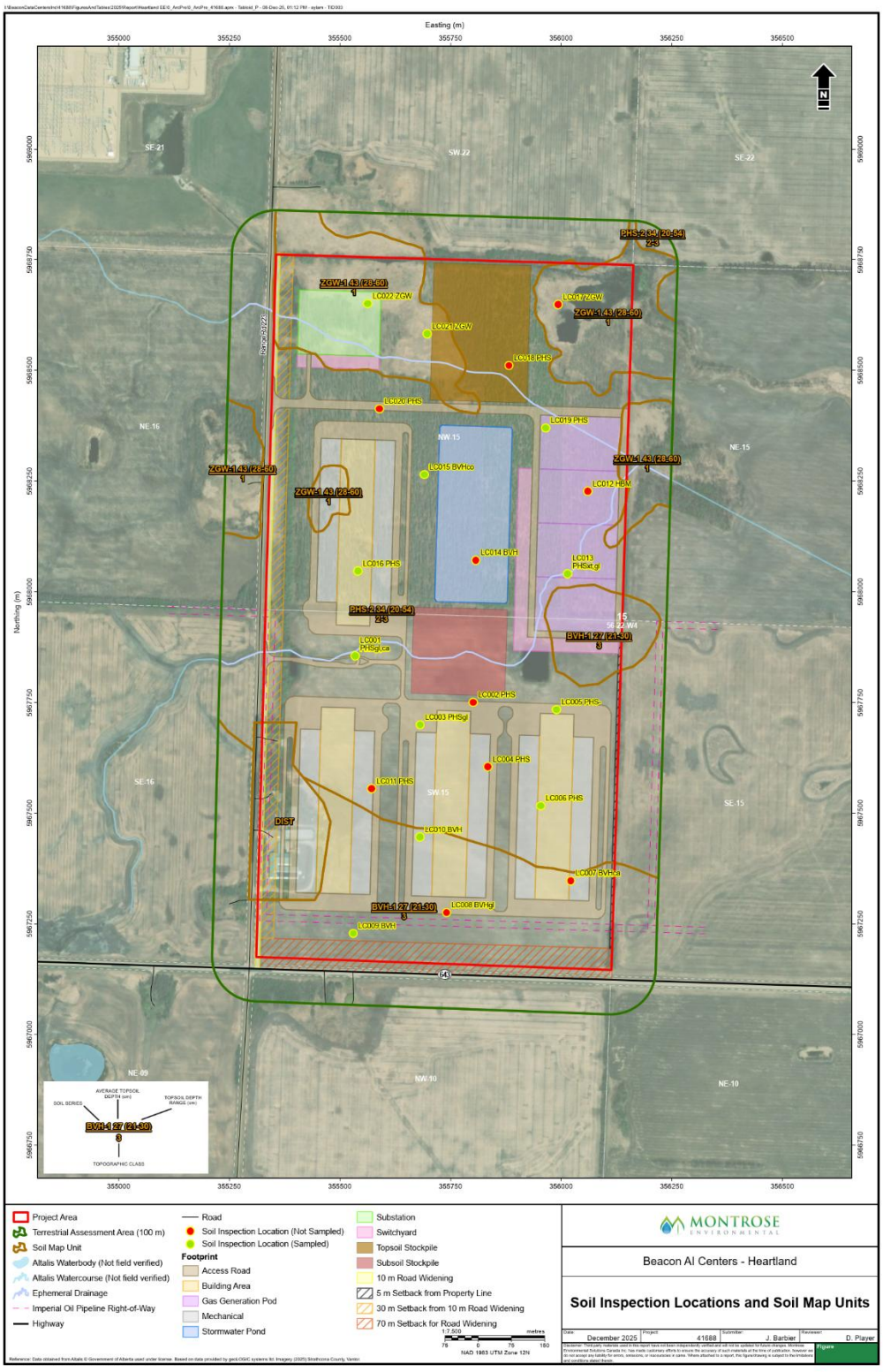

Figure 14.6.1 Disturbed Soils within TAA Map

Table 14.6.6 Summary of Soil Map Units within the Terrestrial Assessment Area

Soil Map Unit	Dominant Soil Series (≥80%)	Soil Series Inclusions (≤20%)	Slope Class	Drainage	Topsoil (LFH/O and A horizons) Depth Range (cm)	Upper Subsoil (B horizons) Depth Range (cm)
BVH-1	Beaverhills	BVHgl/BVHca	3	Imperfect to Well	21 to 30	0 to 26
PHS-2	Peace Hills	BVH/HBM, PHSgl/PHSca	2-3	Imperfect to Rapid	20 to 54	13 to 44
ZGW-1	Undifferentiated Gleysols	BVHgl/BVHca or PHSgl/PHSca	1-2	Poor	12 to 14	N/A

Notes:

BVH, Beaverhills
ZGW, Undifferentiated Gleysols
PHS, Peace Hills
gl, gleyed
ca, calcareous
N/A, Not Applicable

A summary of soil quality ratings for each soil series within the TAA is provided in Table 14.6.7, with full supporting data in Appendix E.

Land suitability ratings for agricultural crops were Class 2, 3, and 5, indicating slight, moderate and very severe limitations for agricultural production, respectively. Limitations for all series were related to temperature, which considers the length of growing season, degree days and day length, as well as the landscape which is considered to have short, complex slopes according to the Land Suitability Rating System for Agricultural Crops (Agronomic Interpretations Working Group 1995). Drainage limitations were associated with the imperfectly and poorly drained gleyed Peace Hills series and undifferentiated gleysols. Moisture, or water supplying ability, was a limiting factor for the drier upland Peace Hills and Beaverhills series.

Reclamation suitability ratings for the topsoil (upper lift) and upper subsoil (lower lift) ranged from poor to good for all upland soil series (Beaverhills and Peace Hills). Reclamation suitability rating for topsoil (upper lift) for the low-lying undifferentiated Gleysols was poor. Limitations associated with each series are presented in Table 14.6.7 below.

Wind erosion risk for the Project was moderate due to loam to sandy loam surface textures. Water erosion risk for the Project was low due to the presence of gentle slope gradients (≤ 5%) across the TAA.

Table 14.6.7 Summary of Soil Series Ratings within the Terrestrial Assessment Area

Soil Series	Land Suitability for Agriculture	Reclamation Suitability Upper		Reclamation Suitability Lower		Wind Erosion Risk	Water Erosion Risk
		Rating	Limitation	Rating	Limitation		
Beaverhills	2 HMT	Good to Poor	None to Reaction, Consistency and CaCO3 (Calcium carbonate)	Fair	Consistency	Moderate	Low
Peace Hills	2 HMT to 3 M	Good to Poor	None to Reaction, Consistency, Organic Carbon	Good to Poor	None to Reaction, Salinity and Consistency	Moderate	Low
Peace Hills, gleyed and/or calcareous	3 W	Fair	Reaction, Consistency and CaCO3	Fair	Reaction, Consistency	Moderate	Low
Undifferentiated Gleysol	5 NW To 5 W	Poor	Salinity, Sodicity, Consistency, CaCO3	N/A	N/A	Moderate	Low

N/A, Not Applicable

14.7 Vegetation and Wetlands

The Project is located in the White Area of Alberta. Highway 643 is located adjacent south of the Project and the nearest residence is approximately 200 m north of the Project. The nearest facility is Sturgeon Refinery Process Delivery located about 3.3 km east of the Project footprint. The planned post-reclamation long term (closure) land use will be agricultural; however, other end land uses at closure are not precluded. The anticipated post-reclamation land use is agricultural; however, alternative end-land uses may be considered at the time of decommissioning. The final long-term land capability will be confirmed in a future Decommissioning and Reclamation Plan.

A qualified ecologist from Montrose conducted a desktop land use assessment and Stantec conducted the desktop wetlands assessment. Stantec completed the wetland field survey for the Project on July 22 and 23, 2025. This section describes the presence and distribution of terrestrial and wetland vegetation species and communities potentially affected by the proposed Project, including any provincially regulated weeds and rare species and ecological communities. The objective of the desktop assessment was to identify potential vegetation and wetland features within or near the Project Area and provide guidance on project site selection and potential risks. The objective of the field assessment was to confirm desktop analyses, and to

collect information on vegetation and wetland resources in the Project Area to develop site specific mitigation, where applicable.

Methods

The TAA was assessed to capture potential direct impacts (i.e., disturbance) to vegetation and wetlands from construction and operations, and indirect effects of the Project (e.g., erosion and sedimentation in adjacent water bodies). Land use and broad vegetation communities were mapped within a 1 km buffer of the Project Area to inform the wildlife assessment (i.e., wildlife assessment area [WAA]).

Desktop

The Alberta Conservation Information Management System (ACO; GoA 2021) database was searched for records of rare species or rare ecological communities and publicly available aerial imagery was used to determine vegetation community cover and land use within the WAA.

Wetlands and water bodies desktop assessments were conducted by Stantec using the following methods. Wetlands identified from current and historical aerial photography were mapped and a preliminary classification was assigned based on image texture, colour, and water permanence following the Alberta Wetland Identification and Delineation Directive (GoA 2015). Historical aerial photography corresponding to dry and wet conditions were used to help identify wetland and ephemeral waterbody boundaries, and to determine a preliminary classification for each. Field-verified wetland and water body shapefiles were provided by Stantec for the purposes of this report.

Field Assessment

Wetland field assessments were conducted by Stantec who provided the following information on their methods. A wetland survey was conducted on July 22 and 23, 2025. Soils, hydrology, and vegetation were examined to confirm the presence of wetlands and, if present, to classify the feature according to the AWCS (ESRD 2015). The following methods were used (where applicable, environment permitting):

- Soils were examined using a shovel to a depth of 29 centimetres (cm; the active rooting zone) in the outermost community of the potential wetland. The depth, texture, colour, and abundance of redox features (i.e., gleys and mottling) in each soil horizon were recorded. Redox features in the upper soil profile develop under conditions on inundation or saturation over a long period of time and are therefore used to determine the extent of each wetland and waterbody. In non problematic soils (i.e., soils that have not been historically altered by agriculture or other human impacts), an area is considered a wetland if redox features were recorded within the top 29 cm and plant species characteristic of wet conditions were also recorded.
- Wetland and ephemeral waterbody hydrology indicators were assessed qualitatively by:
    - Observing whether surface water was present at the site.
    - Looking for evidence of recent saturation or ponding.
    - Observing the topography of the site, including any landscape features that would lead to water accumulation. Evidence of these features includes watermarks on woody vegetation or anthropogenic features, sediment or drift deposits, and algal crusts. Quantitative measurements of hydrological indicators include water depth and depth to saturation (depth at which soil pores are saturated), and, if applicable, pH and electrical conductivity (EC) of water present.

- Vegetation communities larger than 0.01 ha (100 m^2) were sampled within the wetland using 1 m by 1 m plots for herbaceous vegetation. Woody vegetation, when present, was assessed using 10 x 10 m where there was enough woody vegetation for a plot that size; if woody vegetation was smaller than 10 x 10 m, the percentage and size of the woody vegetation in the overall wetland was recorded. Discontinuous communities were sampled by placing subplots in different patches of the same community. Each subplot was assessed for percent cover of dominant vascular species and percent cover of total vascular species, non-vascular species, litter, bare ground, and open water. Outside of the subplots, a random meander was conducted to document uncommon species.
- Wetland boundaries were verified in the field using vegetation community changes where applicable. In areas where vegetation communities were not indicative due to presence of weeds, the presence/absence of hydric soil indicators was used to confirm boundaries. Global positioning system (GPS) tracks were collected and used to assist with mapping refinement.
- Wetland plant dominance classification is from the United States Army Corps of Engineers' National Wetland Plant List using the Great Plains Region (USACE 2022)." (Stantec, pers. comm., November, 2025).

Field work to verify land use in the Project Area was not conducted.

Results

The Project Area, TAA, and wetland features are presented on Figure 14.7.1. Land-use types within the WAA are summarized in Table 14.7.1 and shown in Figure 14.7.1.

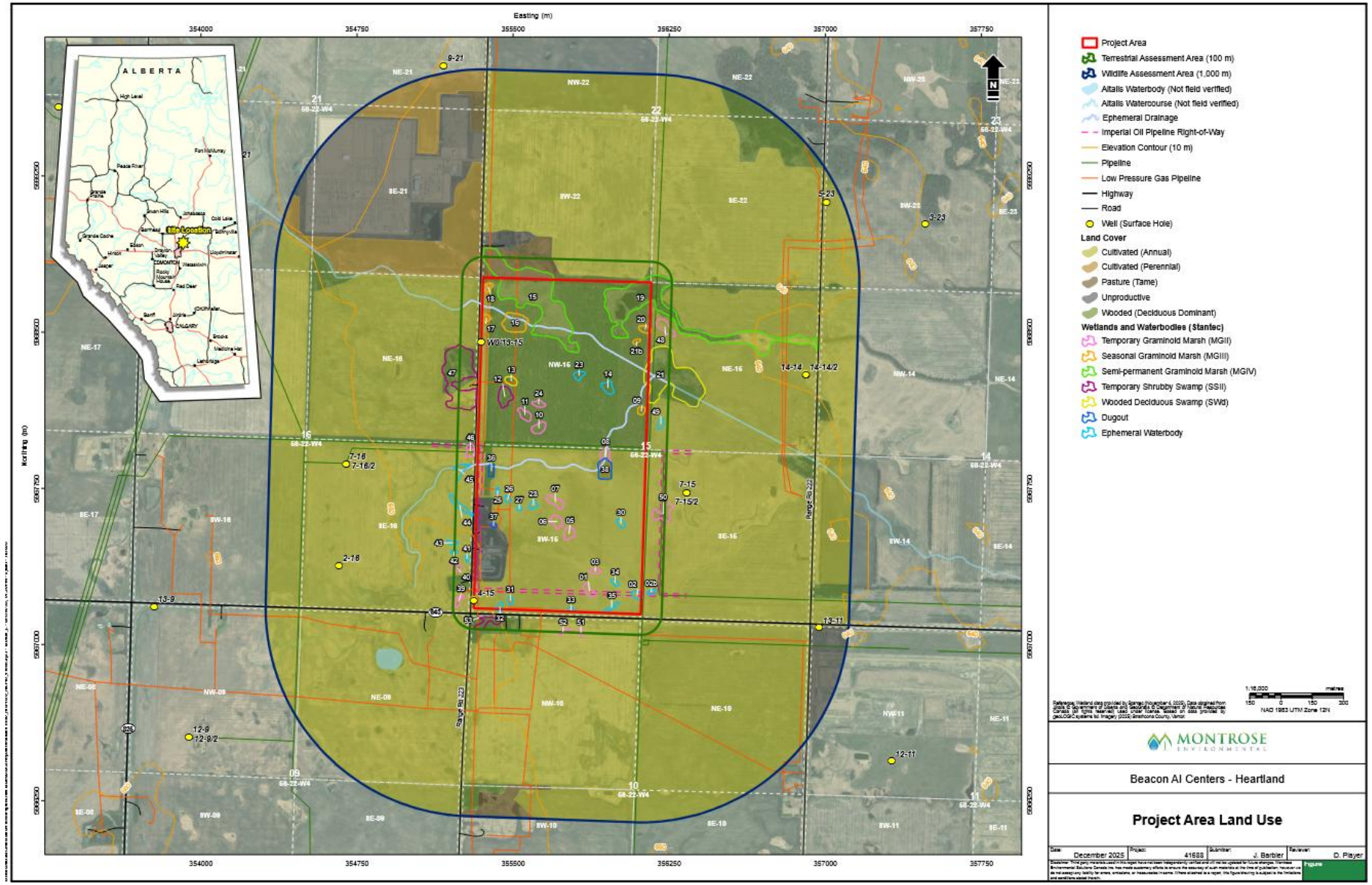

Figure 14.7.1 Projected Area Land Use

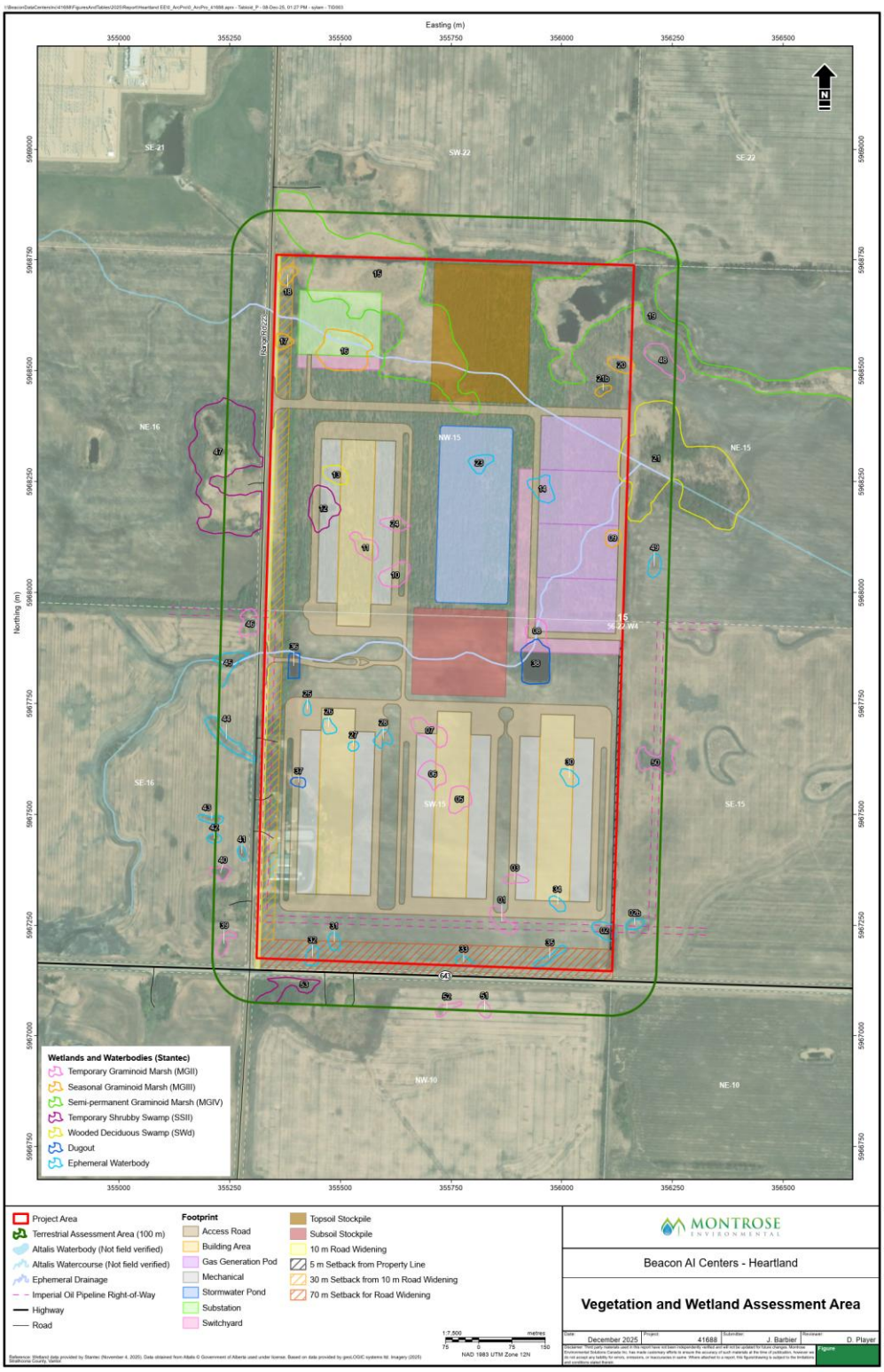

Figure 14.7.2 Vegetation and Wetland Assessment Area

Terrestrial Vegetation

The TAA is located in Dry Mixedwood Natural Subregion of the Boreal Forest Natural Region and is characterized undulating plains and aspen dominated forests (Natural Regions Committee 2006). The Dry Mixedwood Natural Subregion is the warmest boreal Natural Subregion with the warm summers and mild winters. The primary land use for the region is cultivation, occurring in over 50% of the area. Aspen harvesting for pulp and paper production also occurs throughout. This description is consistent with the land use mapped within the WAA.

Land use within the Project area is predominantly cultivated annual (57.1 ha; 45%) and wooded deciduous (50.8 ha; 40%). The wooded deciduous land use within the Project area is not native aspen forest but was historically cultivated and then planted as a tree farm. Other land use within the Project Area includes unproductive (e.g., roads, farm yard; 4.8 h; 4%), wetlands (13.3 ha; 10%), ephemeral water bodies (1.4 ha; 1%) and dugouts (0.8 ha; 1%). Wetlands are further detailed below.

Land use in the TAA is predominantly cultivated annual (90.4 ha; 50%) and wooded deciduous (56.3 ha; 31%), with wetlands (21.5 ha; 12%), unproductive (5.6 ha; 3%), ephemeral water bodies (2.1 ha; 1%), cultivated perennial (0.6 ha, <1%), tame pasture (1.9 ha; 1%) and dugouts (0.8 ha; <1%). The wooded deciduous land use is mostly accounted for by the area which was historically cultivated and then planted as a tree farm.

Vegetation communities and land use within the WAA are primarily cultivated and deciduous dominated wooded areas. Cultivation occupied 81% of the WAA with most being annual crops (714.6 ha; 78%). Wooded areas occupy 9% (80.1 ha) of the WAA. The remaining land uses are 6% (56.4 ha) unproductive, which is area that has been developed or occupied by residences, 3% wetlands (29.3 ha), ephemeral water bodies (2.3 ha, <1%), dugouts (0.8 ha; <1%), and 1% (8.6 ha) tame pasture. Tame pasture is cultivated areas that have been seeded with agronomic species for livestock forage. Wetland areas were only delineated for the TAA and do not represent wetlands across the WAA.

Table 14.7.1 Summary of Land Use

Land use	Project Area		TAA	WAA		%
	ha	%	ha	%	ha	
Cultivated Annual	57.1	45	90.4	50	714.6	78
Cultivated Perennial	-	-	0.6	<1	29.3	3
Wooded Deciduous	50.8	40	56.3	31	80.1	9
Tame Pasture	-	-	1.9	1	8.6	1
Unproductive	4.8	4	5.6	3	56.4	6
Wetland [1]	13.3	10	21.5	12	29.3	3
Ephemeral Water Body [1]	1.4	1	2.1	1	2.3	<1
Dugout [1]	0.8	1	0.8	<1	0.8	<1
Total	128.2	100	179.1	100	921.4	100

Notes: [1] Only wetlands and water bodies that intersected the TAA were mapped into the WAA.

Wetlands and Water Bodies

The wetland desktop and field surveys were conducted within the TAA only and data was provided for this report by Stantec (Figure 14.7.2). Twenty wetlands, thirteen ephemeral water bodies, and three dugouts were identified in the Project Area. Wetlands in the TAA include graminoid marshes, shrubby swamps, and wooded deciduous swamps (Figure 14.7.2). The TAA is comprised of 21.6 ha of wetland area and 2.9 ha of ephemeral water bodies and dugouts (Table 14.7.2).

Stantec also indicated that "Wetland soils observed within SW-15-56-22-W4M were predominantly disturbed by agricultural cultivation including tillage. Wetland areas were either completely cultivated through (typically within ephemeral water bodies or temporary graminoid marshes, or partially cultivated into the drier parts of wetlands, typically seasonal or semi-permanent graminoid marshes. Similar soil conditions would have been expected NW-15-56-22-W4M before the trees were planted, however, the increased organic material and topsoil depth in the lowland and upland soils supports possible topsoil addition added during the tree-planting process."

Two potential watercourses were field verified as ephemeral drainages (Figure 14.7.2) with no bed or bank observed. These watercourses will be considered and incorporated in the stormwater management plan (Montrose 2025).

Table 14.7.2 Summary of Wetlands and Water Bodies

Classification		Area (ha)	
		Project area	TAA
Graminoid Marsh	Temporary	1.9	2.9
	Seasonal	1.4	1.5
	Semi Permanent	9.0	12.1
Shrubby Swamp	Temporary	0.5	2.6
Wooded Deciduous Swamp		0.4	2.5
Ephemeral Water Body		1.4	2.1
Dugout		0.8	0.8
Total		15.4	24.4

Rare Species

A search of the Alberta Conservation Information Management System (ACIMS) database did not return any listed rare element occurrences within the TAA or WAA (AEP 2022).

Weeds

Creeping thistle (Cirsium arvense) and perennial sow-thistle (Sonchus arvensis) were identified within the TAA and Project Area during wetland field surveys. Both are noxious weed species according to the Alberta Weed Control Act (Province of Alberta 2023).

Wildlife and Wildlife Habitat

The purpose of the wildlife assessment is to provide a description of the presence and distribution of wildlife resources within and adjacent to the Project area. A WAA was delineated as the Project area and a surrounding 1,000 m buffer. The objective of the desktop assessment and field surveys is to collect information to develop site-specific mitigation, such as setbacks and timing restrictions for observed wildlife

and wildlife features. Where wildlife features cannot be avoided, site- and Project-specific mitigation, including construction scheduling outside of key activity periods, will be implemented to reduce potential impacts. Wildlife sweeps and nest sweeps will be conducted prior to construction to provide updated information on wildlife features that may require mitigation. The WAA is presented on Figure 14.7.3.

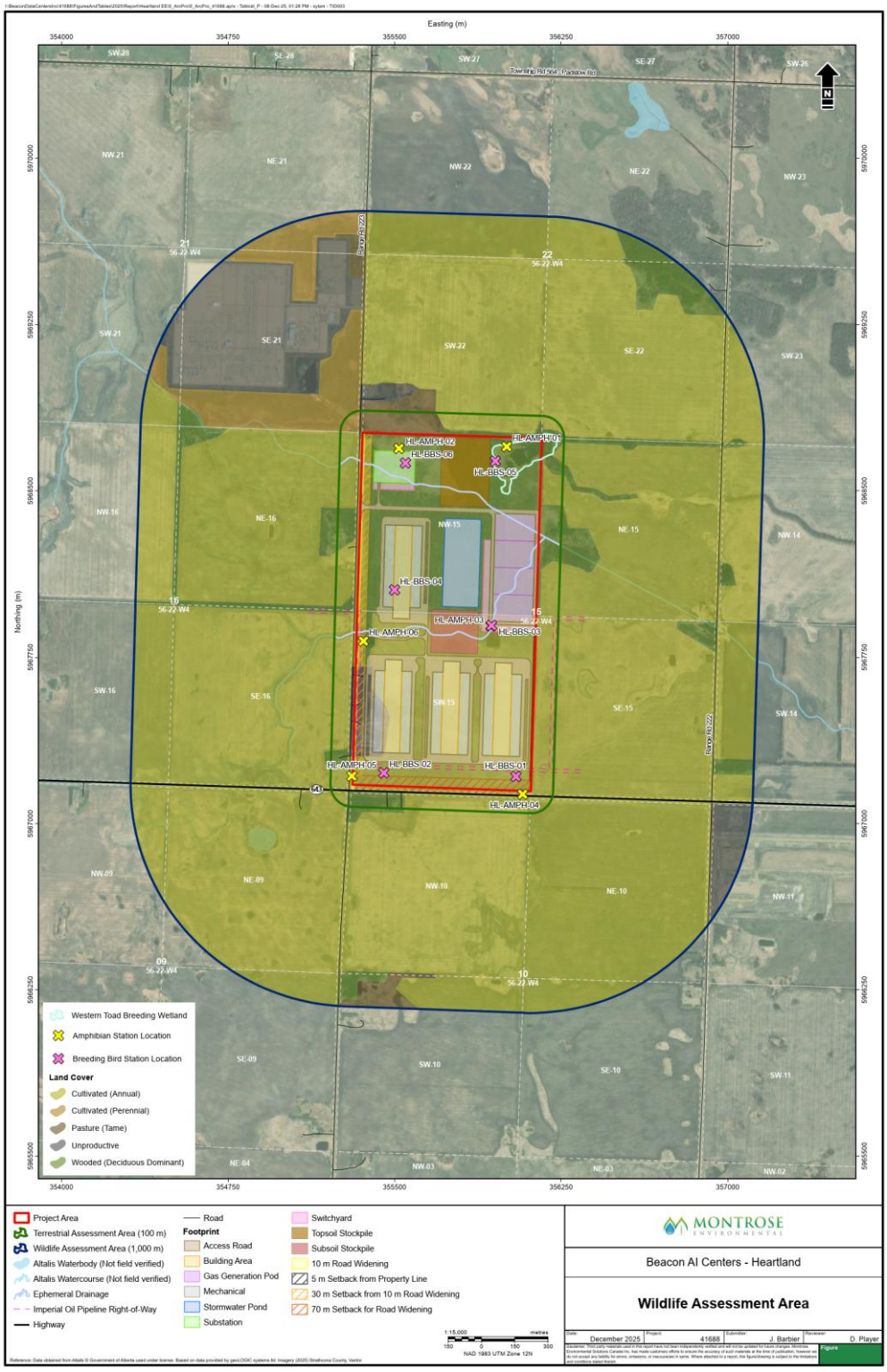

Figure 14.7.3 Wildlife Assessment Area

Methods

Desktop

A desktop wildlife assessment was completed by Montrose that includes site-specific information available within 5 km from the Project, and general information for the region, to account for wildlife movements and setback distances for wildlife species at risk. Fish and Wildlife Internet Mapping Tool (FWIMT; AEPA 2025) data was reviewed to determine if there are historical observations of wildlife species at risk within a 1 and 5 km radius of the Project to understand past occurrences of species at risk. A previous Biophysical Impact Assessment completed for the Project was reviewed for wildlife species observations, habitat descriptions and wildlife-related recommendations (MCA 2024). Species range maps (Federation of Alberta Naturalists [FAN 2007], Smith [1993], Naughton [2012], Russell and Bauer [2000], Alberta Conservation Association [2025], and Cornell University [eBird 2021, Cornell University 2023] and provincial wildlife sensitivity data layers (AEPA 2023) were also reviewed to identify potential species at risk presence and provincially designated sensitive wildlife ranges and zones.

Field surveys

The majority of the WAA is cultivated with areas of wooded forest, wetlands and disturbance (Figure 14.7.2). Habitat was identified that may be suitable for amphibians in the northeastern extend of the Project area; however, it is approximately 100 m away from the proposed footprint. Suitable habitat for raptors and other birds was found within 1 km of the Project footprint.

Acoustic amphibian surveys were conducted on May 22, May 31, and June 15, 2025, and focused on identifying any potential breeding wetlands which may require a setback. Amphibian surveys were conducted according to the Sensitive Species Inventory Guidelines (SSIG; ESRD 2013a).

Breeding bird and raptor surveys were conducted concurrently on May 28 and June 26, 2025 to inform species presence and identify species of concern that may have setbacks associated with the Master Schedule of Standards and Conditions (MSSC; AEP and AER 2024). The MSSC does not apply to developments on private land but has been used as a source for best management practices to implement for wildlife for the Project. The survey focused on identifying:

- presence and habitat use of breeding bird species present within the WAA
- nesting raptors and raptor habitat up to 1 km from the footprint. Raptor and breeding bird surveys were conducted according to the SSIG.

All wildlife field surveys followed the SSIG (ESRD 2013a).

Results

Desktop

The WAA is not within any provincially designated key wildlife sensitivity ranges, zones and areas (AEPA 2025). Species at risk, including American kestrel and eastern kingbird were historically detected within 1 km of the Project (FWIMT data; AEPA 2025). Additional wildlife Species At Risk historically detected within 5 km of the Project include northern leopard frog, American bittern, bald eagle, bank swallow, barn swallow, black tern, broad-winged hawk, common nighthawk, common yellowthroat, eared grebe, eastern phoebe, great gray owl, peregrine falcon, pied-billed grebe, pileated woodpecker, short-eared owl, sora, western tanager, western wood-pewee and American badger, (Table 14.1.12, FWIMT data; AEPA 2025). There are several wildlife species at risk with ranges that overlap the WAA and that could be found where suitable habitat is present (e.g., wetlands and mature deciduous stands; Table 14.7.3)

Table 14.7.3 Wildlife Species at Risk Potentially Occurring in the Region Including Provincial and Federal Species at Risk Status and FWIMT Observations up to 5 km From Project Footprint

Common Name	Scientific Name	AEPA1	Wildlife Act2 and ESCC3	COSEWIC4	SARA4	Observed Historically Within 5 km (FWIMT5)
Amphibians and Reptiles						
Western/Barred tiger salamander	Ambystoma mavortium	Secure	-	Special Concern	Schedule 1 – Special Concern	-
Western toad	Anaxyrus boreas	Sensitive	-	Special Concern	Schedule 1 – Special Concern	-
Northern Leopard Frog	Lithobates pipiens	At Risk	Threatened	Special Concern	Schedule 1 - Special Concern	yes
Canadian Toad	Anaxyrus hemiophrys	May be at Risk	Data Deficient	Not at Risk	-	-
Red-sided/common garter snake	Thamnophis sirtalis	Sensitive	-	-	-	-
Plains garter snake	Thamnophis radix	Sensitive	-	-	-	-
Birds						
Trumpeter swan	Cygnus buccinator	Sensitive	Special Concern	-	-	-
White-winged scoter	Melanitta deglandi	Sensitive	Special Concern	-	-	-
Pied-billed grebe	Podilymbus podiceps	Sensitive	-	-	-	yes
Horned grebe	Podiceps auritus	Sensitive	-	Special Concern	Schedule 1 – Special Concern	-
Eared grebe	Podiceps nigricollis	Sensitive	-	-		yes

Western grebe	Aechmophorus occidentalis	At Risk	Threatened	Special Concern	Schedule 1 – Special Concern	-
American white pelican	Pelecanus erythrorhynch	Sensitive	-	Not at Risk	-	-
American bittern	Botaurus lentiginosus	Sensitive	-	-	-	yes
Great blue heron	Ardea herodias	Sensitive	-	-	-	-
Black-crowned night-heron	Nycticorax nycticorax	Sensitive	-	-	-	-
Yellow rail	Coturnicops noveboracensis	Undetermined	-	Special Concern	Schedule 1 - Special Concern	-
Sora	Porzana Carolina	Sensitive	-	-	-	yes
Sandhill crane	Grus canadensis	Sensitive	-	-	-	-
Black-necked stilt	Himantopus mexicanus	Sensitive	-	-	-	-
Lesser yellowlegs	Tringa flavipes	Secure	-	Threatened	No Schedule - No Status	-
Upland sandpiper	Bartramia longicauda	Sensitive	-	-	-	-
Short-billed dowitcher	Limnodromus griseus	Undetermined	-	-	-	-
Caspian tern	Hydroprogne caspia/Sterna caspia	Sensitive	-	Not at Risk	-	-
Black tern	Chlidonias niger	Sensitive	-	Not at Risk	-	yes
Forster’s tern	Sterna Forsteri	Sensitive	-	Data Deficient	-	-
Sharp-tailed grouse	Tympanuchus phasianellus	Sensitive	-	-	-	-
Bald eagle	Haliaeetus leucocephalus	Sensitive	-	Not At Risk	-	yes
Northern goshawk	Accipiter gentilis	Sensitive	-	Not at Risk	-	-
Broad-winged hawk	Buteo platypterus	Sensitive	-	-	-	yes
Golden eagle	Aquila chrysaetos	Sensitive	-	Not at Risk	-	-
Snowy owl	Bubo scandiacus	Secure	–	Threatened	-	-
Northern pygmy-owl	Glaucidium gnoma	Sensitive	–	-	-	-

Barred owl	Strix varia	Sensitive	Special Concern	-	-	-
Great grey owl	Strix nebulosa	Sensitive	-	Not At Risk	-	yes
Short-eared owl	Asio flammeus	May be at Risk	-	Threatened	Schedule 1 – Special Concern	yes
American kestrel	Falco sparverius	Sensitive	-	-	-	yes
Peregrine falcon anatum subspecies	Falco peregrinus anatum	At Risk	Threatened	Not at Risk	–	yes
Common nighthawk	Chordeiles minor	Sensitive	-	Special Concern	Schedule 1 – Special Concern	yes
Black-backed woodpecker	Picoides arcticus	Sensitive	-	-	-	-
Pileated woodpecker	Dryocopus pileatus	Sensitive	-	-	-	yes
Olive-sided flycatcher	Contopus cooperi	May be at Risk	-	Special Concern	Schedule 1 – Special Concern	-
Western wood-pewee	Contopus sordidulus	May be at Risk	-	-	-	yes
Eastern phoebe	Sayornis phoebe	Sensitive	-	-	-	yes
Eastern kingbird	Tyrannus tyrannus	Sensitive	-	-	-	yes
Loggerhead shrike	Lanius ludovicinus excubitorides	Sensitive	Special Concern	Threatened	Schedule 1 – Threatened	-
Purple martin	Progne subis	Sensitive	-	-	-	-
Bank Swallow	Riparia riparia	Sensitive	-	Threatened	Schedule 1 – Threatened	yes
Barn swallow	Hirundo rustica	May be at Risk	-	Special Concern	Schedule 1 – Threatened	yes
Brown creeper	Certhia americana	Sensitive	-	-	-	-
Sedge wren	Cistothorus platensis	Sensitive	-	Not At Risk	-	-

Sprague's pipit	Anthus spragueii	Sensitive	Special Concern	Threatened	Schedule 1 – Threatened	-
Common yellowthroat	Geothlypis trichas	Sensitive	-	-	-	yes
Blackburnian warbler	Dendroica fusca	Sensitive	-	-	-	-
Bay-breasted warbler	Dendroica castanea	Sensitive	-	-	-	-
Canada warbler	Cardellina canadensis	May be at Risk	Special Concern	Special Concern	Schedule 1 - Threatened	-
Baird's sparrow	Ammodramus bairdii	Sensitive	-	Special Concern	Schedule 1 - Special Concern	-
Western tanager	Piranga ludoviciana	Sensitive	-	-	-	yes
Evening grosbeak	Coccothraustes vespertinus	Secure	-	Special Concern	Schedule 1 - Special Concern	-
Bobolink	Dolichonyx oryzivorus	Sensitive	-	Special Concern	Schedule 1 – Threatened	-
Rusty blackbird	Euphagus carolinus	Sensitive	-	Special Concern	Schedule 1 – Special Concern	-
Mammals						
Little brown myotis	Myotis lucifugus	May be at Risk	Endangered	Endangered	Schedule 1 – Endangered	-
Northern myotis	Myotis septentrionalis	May Be At Risk	Endangered	Endangered	Schedule 1 - Endangered	-
Silver-haired bat	Lasionycteris noctivagans	Sensitive	-	Endangered	-	-
Hoary bat	Lasiurus cinereus	Sensitive	-	Endangered	-	-
Long-tailed weasel	Mustela fruneta	May be at Risk	-	Not at Risk	-	-
American badger taxus subspecies	Taxidea taxus taxus	Sensitive	Data Deficient	Special Concern	Schedule 1 – Special Concern	yes
Canada lynx	Lynx canadensis	Sensitive	-	Not At Risk	-	-

Notes:
1. Alberta Wild Species General Status Listing (GOA 2022)
2. Wildlife Act (Province of Alberta 2022)
3. Endangered Species Conservation Committee and Scientific Subcommittee (AEPA 2025)
4. Species at risk public registry (Government of Canada 2025a)
5. Fish and Wildlife Internet Mapping Tool (AEPA 2025)
- not assessed or not detected

Field surveys

Vegetation and Habitat Verification

During the amphibian, breeding bird and raptor surveys, information was collected to verify vegetation communities in the WAA. Potential habitat for amphibians, raptors, and other birds was noted within the WAA during the surveys. As discussed in Section 14.1, cultivation occupies 81% of the WAA with most being annual crops. Wooded areas occupy 9% of the WAA and the remaining land uses are 6% unproductive (i.e., residential/development), 4% wetlands and water bodies, and 1% tame pasture (Figure 14.1.5). The wooded areas, primarily comprised of mature mixedwood stands, and wetlands may provide opportunities for wildlife to use for essential life stages (breeding, nesting, and foraging).

Amphibian Survey Results

During the amphibian surveys, boreal chorus frogs were heard at survey locations HL-AMPH-01, HL-AMPH-02, HL-AMPH-03, HL-AMPH-04, and HL-AMPH-06 (Figure 14.1.5). Wood frogs were observed visually at survey locations HL-AMPH-01 and HL-AMPH-02. One western toad was heard calling in Wetland 19 near survey location HL-AMPH-01, in the northeast corner of the Project area (Figure 14.1.3). Wetland 19 is classified as a semi-permanent graminoid marsh (Figure 14.1.4). Western toads are a Species At Risk and provincially listed as Sensitive (GoA 2022) are federally listed on Schedule 1 as Special Concern under the Species at Risk Act (Government of Canada 2025b). Western toad breeding wetlands receive a year-round 100m setback as outlined in the Master Schedule of Standards and Conditions (MSSC; AEP and AER 2024). As no setback is proposed for this wetland, the following mitigations are recommended:

- Complete activities that will impact Wetland 19 outside of the western toad breeding and amphibian development periods (Approximately May 1 through September 30, with timing dependent on ice melt based on the SSIG [ESRD 2013a);
- Install silt fence to prevent erosion impacting the wetland outside of the amphibian breeding and development period; and
- If activities that impact Wetland 19 are scheduled to occur within the amphibian breeding and development period;
    - Complete wildlife sweeps during the amphibian breeding period (approximately April to June), before the installation of a silt fence or commencement of activities, and
    - If western toads are detected in the wetland, postpone work or conduct amphibian salvage (i.e. capture and relocation) in consultation with the regulator for any Species At Risk amphibians detected.

Raptor Survey Results

During the raptor survey, the following observations were made:

- Based on territorial calling behaviour of a red-tailed hawk during the raptor survey on June 26, 2025, there was potential for a hawk nest on the northern extent of the Project Area. However, an active nest could not be confirmed at the time. There is no footprint planned within 100 m of the stand of trees suspected to have a hawk nest, and no mitigation is needed;
- Red-tailed hawks were observed incidentally during the field surveys;
- No raptor nests were observed within 1 km of the footprint;

- Suitable habitat with potential for raptor nesting occurs in the Project footprint. No raptor species at risk were detected on the raptor survey or incidentally on any other survey; and
- A mallard nest and a house wren cavity nest were observed within the Project footprint; nests for these species are only protected when active; year-round setbacks do not apply.

Breeding Bird Survey Results

Breeding bird species at risk detected during the breeding bird surveys include common yellowthroat (listed as Sensitive in Alberta, [GOA 2022]). Additional Species At Risk detected incidentally (i.e. outside of the survey point time limit, during the raptor survey) include western wood-pewee (listed as May be at Risk in Alberta [GOA 2022]), and sora (listed as Sensitive in Alberta [GOA 2022]) (Figure 14.7.3). Results of the breeding bird survey are presented in Table 14.7.4. A total of 162 birds were detected, with 31 unique species. The highest overall detections and species diversity were observed near survey stations HL-BBS-05 and HL-BBS-06, likely due to their proximity to wetlands and mature mixedwood forest stands. These habitat types provide foraging and nesting opportunities for waterfowl/waterbirds, raptors, and songbirds. The fewest detections and lowest species diversity were observed at the points surrounded by cultivation (i.e. HL-BBS-01 and HL-BBS-02; Figure 14.7.3).

Additional non-listed species observations detected incidentally during the breeding bird and raptor surveys included the following species: American coot, Baltimore oriole, black-billed magpie, Canada goose, California gull, common raven, dark-eyed junco, European starling, killdeer, Le Conte's sparrow, northern flicker, northern shoveler, orange-crowned warbler, red-tailed hawk, solitary sandpiper, tree swallow, vesper sparrow, warbling vireo, white-crowned sparrow, white-throated sparrow, and Wilson's snipe, coyote, white-tailed deer tracks and moose tracks.

Table 14.7.4 Bird Species Observations by Survey Station Location and Grouped by Guild.

Survey Station	Species Detections by Survey Station					
	HL-BBS-01	HL-BBS-02	HL-BBS-03	HL-BBS-04	HL-BBS-05	HL-BBS-06
	Cultivation	Cultivation	Dugout, mature mixedwood stand, cultivation	Mature mixedwood stand	Mixedwood stand, wetland	Mixedwood stand, wetland, shrubland/ meadow
Waterfowl and Shorebird/Waterbirds						
Blue-winged teal			2		2	
Franklin's gull				6	6	
Mallard		2	2		2	
Spotted sandpiper					1	1
Passerines (Perching Birds/Songbirds)						
Alder Flycatcher						1
American goldfinch				1	3	2
American redstart						1
American robin			2	4	1	
Black-capped chickadee			1			
Cedar waxwing	5					1
Chipping sparrow						2
Clay-coloured sparrow		4				1
Common yellowthroat					1	3
Gray catbird						3

House wren	2		2	3	2	2
Least flycatcher				6	2	1
Lincoln's sparrow						1
Ovenbird				1		
Pine siskin					7	
Red-eyed vireo	1					
Savannah sparrow	6	2				
Song sparrow	2		3	3	2	3
Swamp sparrow					2	2
Warbling vireo					2	
Winter wren			2			
Yellow warbler	1		2	3	3	3
Yellow -rumped warbler						1
Other Birds						
American crow	1	1				
Brewer's blackbird			1		1	
Brown-headed cowbird		3				
Red-winged blackbird			9		6	8
Total # of Detections	18	12	26	27	43	36
Total # of Species Detected	7	5	10	8	16	17

Historical Resources

Heritage resources are regulated by the *Historical Resources Act* and administered by the Archaeological, Archives and Collections Services of Alberta (AACSW).

Historical Resources Act approval (HRA number 4835-25-0120-001) has been granted on December 05, 2005. Any chance discovery of historical resources must be reported to AACSW.

15. Health, Social and Economic Context in the Region

The City of Edmonton is an urban municipality located near Alberta's geographic center. Sturgeon County, a rural municipal district within the Edmonton Metropolitan Region, lies about 40 km northeast of Edmonton. Several localities and hamlets are found within Sturgeon County, including the Town of Gibbons. The City of Fort Saskatchewan is situated roughly 35 km northeast of Edmonton. The municipalities closest to the Project are Fort Saskatchewan (7 km southeast) and Gibbons (7 km west).

Between 2016 and 2021, Edmonton's population grew by 8.3%, rising from 933,088 to 1,010,899, while Sturgeon County's population declined by 2.1%, from 20,495 to 20,061 (Table 15.1.1). Fort Saskatchewan experienced a 12.1% increase, from 24,169 to 27,088, and Gibbons saw a modest 1.8% rise, from 3,159 to 3,218 (Statistics Canada 2023). In 2021, 5.8% of Edmonton's population identified as Indigenous, compared to 8.4% in Sturgeon County (Statistics Canada 2023). Notably, Fort Saskatchewan's Indigenous population grew by nearly 35% between 2016 and 2021. Women+ (including women, girls, and some non-binary persons) represented 50.7% of the study area population in 2021 (Statistics Canada 2023).

Table 15.1.1 Population Characteristics, 2021

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

Source: Statistics Canada 2023

In 2021, unemployment rates were 12.7% in Edmonton and 8.3% in Sturgeon County, compared to the provincial rate of 11.5% (Table 15.1.2) (Statistics Canada 2023). Labour force participation rates across all communities were similar to Alberta's rate of 68.0%, with Fort Saskatchewan having the highest participation at 70.9%.

Table 15.1.2 Population Characteristics, 2021

Location	Population (aged 15 years and older)	Labour Force	Participation Rate (%)	Employed	Unemployed	Unemployment Rate (%)
Edmonton	50,280	58,165	15.7	933,088	1,010,899	8.3
Sturgeon County	1,655	1,640	-0.9	20,495	20,061	-2.1
Fort Saskatchewan	1,420	1,915	34.9	24,169	27,088	12.1
Gibbons	280	295	5.4	3,159	3,218	1.9
Alberta	258,640	284,470	10.0	4,067,175	4,262,635	4.8

Source: Statistics Canada 2023

Median ages in 2021 were 36.8 years in Edmonton, 37.6 in Gibbons, and 36.0 in Fort Saskatchewan, while Sturgeon County had a higher median age of 41.2 years (Statistics Canada 2023). In 2020, median household incomes were $90,000 in Edmonton, $124,000 in Sturgeon County, $108,000 in Gibbons, and $113,000 in Fort Saskatchewan (Statistics Canada 2023).

In Edmonton, the largest share of the labour force worked in sales and service occupations (24.8%) and trades, transport, and equipment operation (18.5%) in 2021. In Sturgeon County, trades, transport, and equipment operation accounted for 24.5%, followed by business, finance, and administration at 16.3% (Statistics Canada 2023).

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

Edmonton, Sturgeon County, Gibbons, and Fort Saskatchewan fall within Alberta Health Service's Edmonton Zone, which offers numerous health facilities and programs. Edmonton has over 20 hospitals and health centers, including the Royal Alexandra Hospital. Fort Saskatchewan and Gibbons each have a health care center, and Fort Saskatchewan also has a community hospital (AHS 2016). The number of physicians in the Edmonton Zone increased from 2,839 in 2019–2020 to 3,057 in 2023–2024 (AHS 2024).

Community health indicators for the Edmonton Zone and Alberta are shown in Table 15.1.3. Residents of both areas reported similar levels of perceived health and mental health in 2020, with about 63% rating their health as very good or excellent and 66% reporting very good or excellent mental health. Females were more likely than males to have a regular healthcare provider, while males reported better mental health overall. Approximately 20% of residents in both areas experienced high levels of stress, with females reporting slightly higher stress than males (Statistics Canada 2022).

Arthritis and asthma were the most common chronic conditions, with females more affected than males, while males had higher rates of high blood pressure. Smoking and heavy drinking rates were similar in both geographies, with males engaging more frequently than females (Statistics Canada 2022).

Table 15.1.3 Health Indicators, 2019/2020

Indicator	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
Substance Abuse and Healthy Living						
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

PART D: Federal, Provincial, Territorial, Indigenous and Municipal Involvement

16. Financial Support from Federal Authorities

No federal financial support is required for the Project. Heartland Power may explore federal grants or funding programs in the future, if 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

The Project must comply with several federal statutes that govern environmental protection, wildlife, species conservation, and infrastructure safety in addition to the *Impact Assessment Act*, as applicable.

Fisheries Act

The *Fisheries Act* protects fish and fish habitat in Canadian waters. Given the limited potential for the Project to interact with fish-bearing streams and the use of municipal water sources, the *Fisheries Act* is not expected to apply. If work results in any watercourse disturbance, appropriate permits and mitigation measures would be required to avoid harmful alteration, disruption, or destruction of fish habitat (DFO 2024).

Migratory Birds Convention Act

Section 6.1 of the *Migratory Birds Regulations* prohibits disturbing, destroying, or removing migratory bird nests, eggs, or shelters without authorization. Construction activities occurring during the nesting period (typically April–August) must follow federal Guidelines to Avoid Harm to Migratory Birds (GOC 2023). Mitigation measures may include pre-construction nest sweeps and buffer zones around active nests.

Species at Risk Act

The *Species at Risk Act* (SARA) protects listed extirpated, endangered, and threatened species and their critical habitat. Current information suggests Project activities are unlikely to contravene SARA. Ongoing wildlife surveys will confirm compliance. If SARA-listed species or habitats are identified, avoidance or site-specific mitigation will be implemented (Government of Canada 2025).

Other Relevant Federal Acts

- *Canadian Navigable Waters Act* – No authorization is required as the design does not involve navigable waters.
- *Aeronautics Act* – The site is near aerodromes (Josephburg ~12 km, Villeneuve ~47 km, Edmonton Heliport ~44 km, Edmonton International Airport ~60 km). An application to Transport Canada in

regards to Obstruction Marking and Lighting and to Nav Canada relating to land use submission is being prepared.

18.2 Provincial Regulatory Requirements

Several provincial acts and regulations apply to the Project's construction and operation, these include:

Hydro and Electric Energy Act

Approval under AUC Rule 007 is required to construct and operate the power plant. AltaLink will submit the associated transmission line application.

Electric Utilities Act

The Alberta Electric System Operator (AESO) oversees all provincial grid connections. A system access service application is required to ensure the Project meets Alberta's competitive market and reliability requirements.

Environmental Protection and Enhancement Act

As a power plant with more than 1 MW of electricity generation capacity, the Project requires an approval under the *Environmental Protection and Enhancement Act*. A Pre-Disturbance Site Assessment and a Topsoil Conservation and Use Plan will accompany the application.

Water Act

Municipal water use means no surface water diversion license is anticipated. Wetlands within the Project area will be directly impacted by the project, resulting in loss of wetland area, with the exception of the semi-permanent graminoid marsh in the northeast corner of NW 15-56-22 W4.- A Wetland Assessment Impact Report has been submitted to AEPA and a *Water Act* Application will be submitted for proposed impacts to wetlands. Thirteen ephemeral water bodies are located in the Project footprint. To address impacts to the ephemeral water bodies in the Project footprint, Heartland Power will seek approval under the *Water Act* before construction commences. Two potential watercourses were field verified and confirmed as ephemeral drainages with no bed or bank observed. These watercourses have been considered and incorporated in the stormwater management plan (Montrose 2025).

Historical Resources Act

Heritage resources are regulated by the *Historical Resources Act* and administered by the Archaeological, Archives and Collections Services of Alberta (AACSW).

Historical Resources Act approval (HRA number 4835-25-0120-001) has been granted on December 05, 2005. Any chance discovery of historical resources must be reported to AACSW.

Pipeline Act

The *Pipeline Act* establishes the regulatory framework for pipelines in Alberta. The natural gas lateral supplying the Project will connect to the NOVA Gas Transmission Ltd. (NGTL) system. NGTL will be responsible for obtaining the applicable regulatory approvals for the lateral pipeline under the *Pipeline Act* and AER Directive 056 (TC Energy 2025).

Public Lands Act

The *Public Lands Act* applies mainly to Crown land and water bodies. The Project is on private land, except for Crown-claimable wetlands.

18.3 Municipal Regulatory Requirements

Sturgeon County's 2022–2025 Strategic Plan outlines community outcomes and priorities that guide growth and development. Several municipal bylaws inform land use and planning in the Project area. These are summarized in Table 18.3.1.

Table 18.3.1 Municipal Regulatory Requirements

Bylaw or Policy	Description
Sturgeon County Municipal Development Plan Bylaw #1313/13 (Sturgeon County 2014)	Provides long-range planning direction for future growth, including land use, environmental stewardship, infrastructure, social, cultural, and economic considerations.
Sturgeon County Land Use Bylaw 1385/17 (Sturgeon County 2017)	Regulates and controls the use and development of land and buildings within the County.
Alberta's Industrial Heartland Area Structure Plan Bylaw 1118/07 (Sturgeon County 2007)	Establishes the planning framework for industrial development within the Alberta Industrial Heartland and updates prior ASP Bylaw 900/00.

18.4 Regional Plans and Management Frameworks

Industrial Heartland Designated Industrial Zone Directive

The Project is located within Alberta's Industrial Heartland – Designated Industrial Zone (IH-DIZ) in Sturgeon County. The IH-DIZ is managed through a collaboration among five municipal partners—the City of Fort Saskatchewan, Lamont County, Strathcona County, Sturgeon County, and the City of Edmonton—under the Alberta Industrial Heartland Association, a non-profit organization that promotes responsible industrial development in the region.

A regulatory framework specific to the IH-DIZ establishes principles, policies, and operational expectations to support investment, employment, and environmental performance. The Industrial Heartland Designated Industrial Zone Directive provides a coordinated regulatory approach and outlines required operational policies and guidelines for air, water, and soil management within the zone.

Operators in the IH-DIZ must follow several region-specific environmental management documents, including:

- *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) – IH-DIZ implementation version (AEP 2022b).*
- *Air Emissions Requirements Policy for the IH-DIZ (AEP 2022c).*
- *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, Off-Site Storage, and Off-Site Use of Topsoil (GOA 2022).*

These documents collectively guide cumulative effects management, establish expectations for air and water quality outcomes, and coordinate soil conservation practices across the IH-DIZ.

North Saskatchewan Region

The Project is also situated within the North Saskatchewan Region, one of seven land-use planning regions under Alberta's Land-Use Framework. Development of the North Saskatchewan Regional Plan (NSRP) began in 2014. Completed work includes:

- *preparation of the Terms of Reference,*
- *appointment of the Regional Advisory Council,*
- *submission of the Council's recommendations to the Government of Alberta, and*
- *completion of the first phase of public engagement.*

Once finalized, the NSRP will provide regional objectives and cumulative effects frameworks relevant to air, land, water, and biodiversity.

In addition, the Northeast Capital Industrial Association (NCIA) has developed a Regional Noise Management Plan (RNMP) for the IH-DIZ (NCIA 2022). The RNMP establishes a coordinated, regional approach to industrial noise management and includes:

- *a regional noise modelling platform that integrates member-submitted site models to generate cumulative sound predictions, and*
- *best practices for noise control and mitigation across industrial operators in the region.*

The RNMP supports compliance with AER Directive 038 and AUC Rule 012 and ensures consistent noise-management standards among industries operating in the Industrial Heartland.

PART E: Potential Effects of the Project

The Project consists of a natural-gas-fired power generation facility. Related infrastructure to the Project includes a new power transmission line (to be developed by AltaLink), a natural gas lateral pipeline (to be developed by NGTL), and ancillary infrastructure regulated under provincial legislation.

The Project is co-located with four (4) data halls as part of an on-site data center capable of supporting Tier IV data-centre operations.

As noted above, although the data center is not a Project component, Heartland Power has included consideration of the data center in its assessment where relevant to provide the IAAC with a fulsome representation of the data centre campus based on most accurate information and assumptions known at this time.

19. Potential Changes under Federal Legislative Authority

19.1.1 Fish and Fish Habitat

The Project is not expected to cause adverse effects on fish or fish habitat as defined under subsection 2(1) of the *Fisheries Act*.

No impacts to aquatic species at risk are anticipated.

The representations in this section apply to the entire data center campus (i.e., Project and data center).

Effect Pathways

Construction

The Project site is located approximately 6 km west of the North Saskatchewan River and 4 km southwest of the Sturgeon River. Five unnamed tributaries of each system occur within 5 km of the site, but no watercourses are located within or adjacent to the Project footprint.

Because the Project will not involve work below the ordinary high-water mark and will not require new permanent or temporary waterbody crossings, construction activities are unlikely to affect surface water, fish, or fish habitat.

All water required for construction will be sourced municipally; therefore, no withdrawals from the North Saskatchewan River or its tributaries are anticipated.

If a temporary crossing is required unexpectedly, it will be installed using best practices such as clear-span structures or ice/snow fills during frozen conditions.

Operation

No operational effects on fish, fish habitat, or aquatic species at risk are expected.

The only potential interaction relates to stormwater management:

- *The site will be regraded and runoff will be directed to a stormwater pond via berms, swales, and ditches.*
- *No uncontrolled flows will reach watercourses due to distance, existing development, and vegetated buffers.*

- *Any stormwater discharge will comply with Environmental Protection and Enhancement Act (EPEA) water quality requirements and maintain existing drainage patterns.*

Decommissioning and Abandonment

No adverse effects on fish or fish habitat are anticipated during decommissioning. Work will occur away from any waterbodies, and no disturbance below the ordinary high-water mark is expected.

Mitigation

Construction

No additional mitigation measures are required, as construction is not expected to affect surface water, fish, or fish habitat.

Operation

No further mitigation measures are necessary for operations, given the absence of anticipated effects.

Decommissioning and Abandonment

Mitigation measures similar to those applied during construction will be implemented during decommissioning and abandonment to minimize potential impacts.

19.1.2 Aquatic Species at Risk

The Project is not expected to affect aquatic species at risk as defined under subsection 2(1) of the *Species at Risk Act*. No watercourse disturbance is proposed, no surface water withdrawals will occur, and no suitable aquatic SARA habitat exists within or adjacent to the Project footprint.

The representations in this section apply to the entire data center campus (i.e., Project and data center).

19.1.3 Migratory Birds

The Project is anticipated to have negligible effects on migratory birds as defined under subsection 2(1) of the *Migratory Birds Convention Act* (MBCA), 1994.

Potential effects relate primarily to habitat alteration, sensory disturbance, and nest disturbance during construction.

The representations in this section apply to the entire data center campus (i.e., Project and data center).

Effect Pathways

Construction

Vegetation and wetland clearing will result in direct habitat loss, including removal of trees, shrubs, grasslands, wetlands, and cultivated areas used for nesting and foraging.

Indirect effects may occur outside the construction footprint through sensory disturbance from vehicle and equipment noise. While the Project will not create physical barriers to bird movement, removal of habitat patches may alter local movement patterns.

Ground disturbance during the migratory bird breeding season increases the risk of inadvertent nest destruction, which is prohibited under the MBCA.

Table 19.1.3.1 summarizes the potential effects and effect pathways on wildlife and wildlife habitat (including for species at risk and migratory birds) that may occur.

Table 19.1.3.1 Potential Construction Phase Effects on Wildlife and Wildlife Habitat

Potential Effect	Activity Description	Pathway
Habitat Loss	Clearing of vegetation and wetlands reduces nesting and foraging areas.	Vegetation removal and site grading.
Sensory Disturbance	Noise and activity from equipment may displace birds from adjacent habitats.	Construction equipment and vehicle movement.
Movement Disruption	Loss of habitat patches may alter local movement patterns.	Clearing and grading within Heartland Power lands.
Mortality Risk	Accidental nest destruction and collisions during breeding season.	Ground preparation and vegetation removal.

Operation

Potential operational effects are limited compared to construction.

Sensory disturbance from noise and lighting may reduce habitat suitability in nearby areas, and occasional vehicle traffic could pose mortality risks.

Table 19.1.3.2 summarizes the potential effects and pathways that may occur.

Table 19.1.3.2 Potential Operations Phase Effects on Wildlife and Wildlife Habitat

Potential Effect	Activity Description	Pathway
Sensory Disturbance	Ongoing noise and lighting may reduce habitat suitability.	Operation of equipment and facility lighting.
Movement Disruption	Infrastructure may alter local wildlife movement patterns.	Presence of facility structures.

Mortality Risk	Vehicle traffic during maintenance may increase collision risk.	Routine operational activities.

Decommissioning and Abandonment

Typical decommissioning activities (e.g., equipment removal, ground disturbance, increased vehicle traffic) may temporarily affect wildlife habitat and increase mortality risk. Effects are expected to be short term and reversible.

Mitigation

Construction

Mitigation measures for wildlife and wildlife habitat, including migratory birds and species at risk, are provided in Table 19.1.3.3. Additional site-specific measures will be developed as Project planning progresses.

Table 19.1.3.3 Potential Construction Phase Mitigation Measures for Wildlife and Wildlife Habitat.

Mitigation Measure	Description	Objective
Nest Searches	Conduct pre-construction nest surveys during breeding season.	Avoid destruction of active nests.
Exclusion Fencing	Install fencing around sensitive habitats.	Prevent wildlife entry into active work areas.
Lighting Control	Limit floodlighting during migration periods.	Reduce sensory disturbance.
Speed Restrictions	Implement speed limits for vehicles in construction zones.	Reduce collision risk for wildlife.

With mitigation, construction will result in long-term direct habitat loss, but indirect effects (disturbance, movement disruption, mortality risk) will be short term, low magnitude, and reversible.

Operation

Operational mitigation measures are summarized in Table 19.1.3.4.

Table 19.1.3.4 Potential Operation Phase Mitigation Measures for Wildlife and Wildlife Habitat

Mitigation Measure	Description	Objective
Efficient Lighting	Use directional lighting to minimize light trespass.	Reduce disturbance to wildlife.

Noise Management	Maintain equipment to minimize noise emissions.	Limit sensory disturbance during operations.
Traffic Control	Restrict unnecessary vehicle movement and enforce speed limits.	Reduce collision risk and disturbance.

Residual effects during operations are expected to be low magnitude, long term, and reversible, with minimal sensory disturbance and low mortality risk.

Decommissioning and Abandonment

Mitigation similar to construction (e.g., nest sweeps, traffic control, lighting management, erosion/sediment controls) will be implemented to limit potential effects on migratory birds and wildlife during decommissioning.

19.2 Overview of Other Environmental Effects

19.2.1 Other changes to the environment

Air Quality

The entire data center campus (i.e., Project and data center) has been considered in the Air Quality Assessment.[1]

Effect Pathways

Construction

During construction, air quality effects will mainly arise from exhaust emissions produced by construction equipment and from fugitive dust generated by ground disturbance. These effects are typical for large construction projects and are temporary in nature. Table 19.2.1.1 summarizes potential effects and associated pathways.

Table 19.2.1.1 Potential Construction Phase Effects on Air Quality

Potential Effect	Effect Pathways
Change in air quality	Dust generated during soil stripping and grading and through equipment and vehicle movement on the construction site and unpaved roads
	Air contaminant emissions from equipment and vehicles combusting hydrocarbon fuel during construction activities

Fugitive dust from surface disturbance contains particles across several size ranges (e.g., $PM_{2.5}$, PM_{10}, and total suspended particulate (TSP)). These can deposit on off-site surfaces (dustfall). Larger particles are removed near the disturbance area via gravitational settling and are the main contributor to dustfall, while PM_{10} and $PM_{2.5}$ can be transported further downwind.

[1] The condensing boilers to supply heat to the data center halls have been included.

Typical exhaust-emitting equipment includes excavators, rock movers, graders, packers, dozers, haul trucks, zoom-booms, concrete trucks, and tunnel-casing pullers. Most of this equipment uses diesel, with combustion products released to the atmosphere. Diesel-powered generators, light plants, and in-line heaters may also be used. Major combustion products are nitrogen (N_2), CO_2, and water vapour, with trace contaminants such as NOx, CO, particulate matter (PM), including diesel PM, and volatile organic compounds (VOCs). These gases and particles are typical by-products of fossil-fuel combustion.

Detailed construction planning is not yet complete; therefore, estimates of equipment types, quantities, and material moved are unavailable, preventing reasonable quantification of construction emissions. Construction emissions will be limited to the construction phase and are typically less than operational emissions for most pollutants.

Operation

During operation, air contaminants will be emitted primarily from natural-gas combustion in the proposed lean-burn engines. Key pollutants include NOx, PM2.5, and CO. Emissions are minimized by using clean-burning natural gas and applying advanced controls such as selective catalytic reduction (SCR). Emissions of metals and polycyclic aromatic hydrocarbons (PAHs) are expected to be negligible. Minor sources such as fuel-gas heaters may also contribute. Table 19.2.1.2 outlines the typical operational effects and pathways.

Operational emissions have been conservatively estimated assuming a power generation facility without carbon capture. If a carbon-capture unit is constructed and operating, it may introduce trace VOC emissions from the solvent and could incidentally reduce other pollutants.

Table 19.2.1.2 Potential Operation Phase Effects on Air Quality

Potential Effect	Effect Pathways
Change in air quality	Air contaminant emissions from natural gas-fired equipment (e.g., gas-fired engines) during operation

The maximum estimated emissions from the Project were calculated based upon the type and size of the natural gas fired engines 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 19.2.1.3. 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 19.2.1.3 Project Operations Phase Air Contaminant Emissions

Pollutant	Potential Annual Emissions (tonne/year)
NO_X	471
CO	902
$PM_{2.5}$	120

Decommissioning and Abandonment

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

Mitigation

Construction

Potential construction-phase air-quality mitigation measures typical for power-generation projects are listed in Table 19.2.1.4. Transportation and major component construction will drive the highest short-term emissions; other activities (e.g., site preparation) contribute smaller amounts. Although construction may span over two years, emission rates will vary substantially. Given the short duration and limited magnitude, substantial ambient-air-quality changes are unlikely.

Table 19.2.1.4 Potential Construction Phase Mitigation Measures for Air Quality

Potential Effect	Effect Pathways	Mitigation Measures
Change in air quality	Dust generated during soil stripping and grading, and through vehicle/equipment movement on the construction footprint and unpaved roads	• Conduct work in ways that minimize dust generation. • Apply dust suppression (e.g., water) and pause activities during high winds. • Promptly revegetate disturbed surfaces to prevent wind erosion. • Stabilize temporary stockpiles (e.g., cover or vegetate).
	Air-contaminant emissions from equipment and vehicles burning hydrocarbon fuel during construction activities	• Require vehicles/equipment to meet applicable emission standards (On-Road Vehicle and Engine Emission Regulations; Off-road Compression- and Large Spark-Ignition Engine Emission Regulations). • Ensure sulphur concentration in diesel does not exceed 15 mg/kg (Sulphur in Diesel Fuel Regulations). Reduce idling as a best practice.

Operation

Operational air-quality mitigation measures typical for power-generation facilities are shown in Table 19.2.1.5. Additional facility-specific measures may be developed as engineering advances. Project NOx emissions will meet applicable provincial (AEPA 2025) and federal requirements (ECCC 2016).

Table 19.2.1.5 Potential Operations Phase Mitigation Measures for Air Quality

Potential Effect	Effect Pathways	Mitigation Measures
Change in air quality	Air contaminant emissions from hydrocarbon-fueled equipment (e.g., engines) during operation	• Design to meet ambient-air-quality objectives and best-available control technology (BACT). • Use clean-burning natural gas to lower $PM_{2.5}$ and SO_2 emissions. • Install advanced controls (e.g., SCR) to limit NOx to regulated levels; SCR may cause negligible ammonia slip (NH_3). • Ensure NOx emissions are below the Multi-Sector Air Pollutants Regulations (ECCC 2016) and Guidance for managing nitrogen oxide (NOx) emissions from reciprocating engines used for

		electricity generation: staff directive (AEPA 2005).AEPA guidance for reciprocating engines (2025).

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.

Acoustic Environment

The entire data center campus (i.e., Project and data center) has been considered in the Noise Impact Assessment.

Effect Pathways

Construction

Construction-phase noise will originate from equipment and vehicles. Table 19.2.1.6 summarizes typical effects and pathways for the construction of a power-generation facility.

Table 19.2.1.6 Potential Construction Phase Effects on the Acoustic Environment

Potential Effect	Effect Pathways
Change in existing sound levels that may cause noise annoyance	Noise emissions from stationary and mobile equipment used to construct the facility

Construction activities may include site clearing, surface preparation, excavation, access-road construction, foundation work, and installation of major equipment. Mobile sources include excavators, rock movers, graders, packers, dozers, haul trucks, zoom-booms, concrete trucks, and worker vehicles; stationary sources include generators and light plants. Earth-moving and concrete work are short-term and seasonal. Construction noise is expected to be comparable to other local construction and traffic.

Provincial and local requirements typically address construction noise qualitatively (nuisance-based). Site preparation generally produces the highest noise levels; daytime worker traffic may marginally increase noise during arrivals and departures.

Operation

Operational noise primarily arises from engines and generator units, exhausts, ventilation openings, coolers, compressors, pumps, and transformers. Table 19.2.1.7 summarizes typical operational effects and pathways.

Table 19.2.1.7 Potential Operations Phase Effects on the Acoustic Environment

Potential Effect	Effect Pathways
Change in existing sound levels that may cause noise annoyance	Noise emissions from operation of the facility

As described in Section 14.3, A Noise Impact Assessment (NIA) has been completed for the Project, comparing baseline, Project, and cumulative ("Application Case") sound levels at nearby receptors against permissible sound level thresholds established specifically for the IH-DIZ. The modeling results indicate that the predicted cumulative sound levels of both Application Case and Foreseeable Application Case meet the daytime and nighttime PSLs at all receptors. Also, based on AUC Rule 012 prescribed approach, low frequency noise effect is not expected at all receptors. Therefore, the Project complies with the AUC Rule 012 requirements (Stantec, 2025).

Mitigation

Construction

Construction noise can be reduced through administrative and engineering controls. Typical measures are listed in Table 19.2.1.8. A Construction Noise Management Plan may be used to guide scheduling, mitigation, communications (including complaint response), and monitoring, as required.

Table 19.2.1.8 Potential Construction Phase Mitigation Measures for Noise

Potential Effect	Effect Pathways	Mitigation Measures
Change in existing sound levels that may cause noise annoyance	Noise emissions from stationary and mobile equipment used to construct the facility	• Limit construction activities to daytime. • Maintain noise-abatement equipment in good working order. • Minimize idling. • Site staging/laydown areas to reduce impact on sensitive receptors. • Install enclosures for generators/compressors. • Avoid simultaneous operation of high-noise equipment where practicable. • Reroute construction and truck traffic when feasible. • Notify nearby residents prior to high-noise activities (e.g., pile driving). • Implement a complaint-response procedure.

Operation

The NIA indicates compliance with all applicable requirements. Examples of mitigation measures that may be implemented during operation are listed in Table 19.2.1.9 and are typical to the operation of power generation projects. As detailed design information become available, specific mitigation measures can be developed if required.

Table 19.2.1.9 Potential Operations Phase Mitigation Measures for Noise

Potential Effect	Effect Pathways	Mitigation Measures
Change in existing sound levels that	Noise emissions from operation of the facility	• Use enclosures on dominant sources.

Potential Effect	Effect Pathways	Mitigation Measures
may cause noise annoyance		• Procure equipment with low-noise ratings. • Apply attenuation on air-cooled condensers (ACC) (e.g., lower fan speed, low-noise blades, acoustic materials). • Incorporate attenuation on engine exhausts, equipment, and building ventilation (e.g., insulation, inline silencers) as required.

Geology and Hydrogeology

The assessment includes the entire data center campus (i.e., Project and data center).

Effect Pathways

Construction

The Project lies within the North Saskatchewan River Watershed Alliance (GOA 2018) and is underlain by the Wapiti and Belly River formations (Stein 1976). Unconsolidated sediments in the area include clay, sandy clay, till, sand, clay and rocks, and sand and rocks. Groundwater levels are relatively high, so interaction during excavation is possible.

Construction activities (e.g., excavation and potential dewatering) could alter groundwater quantity and quality, and accidental spills in shallow groundwater areas could have effects. Table 19.2.1.10 summarizes potential construction-phase effects and pathways.

Table 19.2.1.10 Potential Construction Phase Effects on Groundwater

Potential Effect	Effect Pathways
Change in groundwater quality or quantity	Accidental spills
	Disturbance of pre-existing contamination (if discovered)
	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

Operation

Table 19.2.1.11 summarizes the potential effects and pathways that may occur, and which are typical of facility operations.

Table 19.2.1.11 Potential Operation Phase Effects on Groundwater

Potential Effect	Effect Pathways
Change in groundwater quality or quantity	Accidental spills
	Alteration of shallow groundwater levels through water diversions

Construction dewatering will follow standard practices, directing discharge away from drainage courses, water bodies, and wetlands. Drawdown is expected to be low due to shallow excavations and short dewatering durations. Spills will be contained, removed, and remediated as needed.

Liquid discharges will primarily be stormwater routed to a lined on-site pond to prevent leaching to groundwater. Rarely, spilled contaminants (e.g., diesel, gasoline, industrial oil) may reach the pond via runoff; a Project-specific spill response and reporting plan will be implemented before operations begin. Operational surface runoff will not interact with groundwater.

Mitigation

Construction

Standard construction practices and best-management plans for dewatering effectively limit disturbances to local groundwater. Representative measures are listed in Table 19.2.1.12. With these measures, construction-related effects on groundwater are not anticipated.

Table 19.2.1.12 Potential Construction Phase Mitigation Measures for Groundwater

Potential Effect	Effect Pathways	Mitigation Measures
Change in groundwater quality or quantity	Accidental spills	• Develop and implement spill-risk procedures. • Contain, remove, and remediate contaminants if a spill occurs. • Meet federal/provincial spill-response and reporting requirements. • Use secondary containment for refueling; place spill trays under stationary equipment near shallow groundwater.
	Disturbance of pre-existing contamination (if discovered)	• Implement contamination management and contingency plans if potentially contaminated soil or water is encountered.
	Disturbance to soil and parent material above or below the water table may change physical hydraulic properties Alteration of shallow groundwater levels or flow rates through dewatering	• Monitor water levels in open excavations; limit trench-open times. • Discharge water away from drainage courses, water bodies, and wetlands (locations identified by a qualified environmental monitor). • Monitor discharge sites for erosion/saturation or off-site flow; suspend or adjust dewatering and apply erosion control if needed.

Operation

Mitigation measures during the operations phase include monitoring of the groundwater network for potential contaminants related to operation of the Project. Once the hydrogeological investigation for the Project is completed, the potential residual effects on groundwater quantity will be evaluated and included in the DPD (if required).

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.

Soils

The assessment includes the entire data center campus (i.e., Project and data center).

Effect Pathways

The Project lies 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). Potential effects on soil quality and quantity could occur during construction, operation, and decommissioning/abandonment.

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.

Topsoil will be stripped where clearing, trenching, and grading are required; stockpiles will be stored on-site until reclamation during decommissioning/abandonment. Exposed soils may be susceptible to wind and water erosion. Vehicle/equipment traffic—especially under wet conditions—can cause compaction, rutting, and loss of soil structure. Admixing of horizons may occur during salvage/storage/trenching where colour contrasts are subtle. Terrain grading may alter surface drainage, affecting soil moisture and erosion risk. Although the area is previously cultivated (and contamination is unlikely), historical spills are possible. Table 19.2.1.13 summarizes construction-phase effects and pathways.

Table 19.2.1.13 Potential Construction Phase Effects on Soils

Potential Effect	Effect Pathways
Change in soil quality or quantity	Soil contamination through disturbance of pre-existing contamination (if discovered), contaminated dust accumulation, or accidental spills
	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 volume loss through wind and water erosion during clearing, grading, and soil handling
	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 19.2.1.14 summarizes the potential effects and pathways that may occur, and which are typical of power generation facility construction projects.

Table 19.2.1.14 Potential Operation Phase Effects on Soils

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

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 19.2.1.15 provides the potential effects and pathways that may occur during decommissioning and/or abandonment of the Project.

Table 19.2.1.15 Potential Decommissioning and Abandonment Phase Effects on Soils

Potential Effect	Effect Pathways [1]
Change in soil quality or 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, top-soil 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

Mitigation

Construction

Mitigation measures to be implemented as appropriate during construction to address potential effects on soil quality and quantity are listed in Table 19.2.1.16 and are typical for similar facility construction projects. As Project planning progresses, further mitigation measures, including Project-specific mitigation measures for sensitive resources, will be developed.

Table 19.2.1.16 Potential Construction Phase Mitigation Measures for Soils

Potential Effect	Effect Pathways	Mitigation Measures
Change in soil quality and quantity	• Soil volume loss through wind and water erosion • Compaction/rutting/loss of structure • Admixing during grading/handling • Contamination from pre-existing sources, dust, or spills • Altered terrain contours including subsidence through grading or trenching	• Maintain intact ground where grading is unnecessary. • Suspend topsoil stripping during excessively wet or high-wind conditions. • Limit motorized traffic in wet conditions and confine movement to suitable surfaces to minimize compaction and rutting. • Salvage soil per the Topsoil Conservation Use Plan (separate topsoil/subsoil; alternative handling for problem soils). • Ensure a qualified soil environmental professional (or designate) oversees salvage to minimize admixing of contrasting horizons (e.g., suitable topsoil over unsuitable saline-sodic subsoil such as Camrose series). • Avoid storing salvaged soils in low areas susceptible to spring breakup. • Backfill/compact trenches in lifts when not frozen; prevent trench crowning. • Regrade rutted/eroded areas and settled trenches; scarify seedbeds as needed. • After adverse weather, verify erosion and sediment control (ESC) effectiveness and correct if required. • Restore grades and drainage to pre-construction contours or stable grade, unless directed otherwise by regulators. • Develop a Soils Contingency Plan for any suspected contamination encountered.

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 19.2.1.17 and are typical for similar facility construction projects. As Project planning

progresses, further mitigation measures, including Project-specific mitigation measures for sensitive resources, will be developed.

Table 19.2.1.17 Potential Operation Phase Mitigation Measures for Soils

Potential Effect	Effect Pathways	Mitigation Measures
Change in soil quality and quantity	• Soil contamination through accidental spills • 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	• Monitor disturbance areas and stockpiles for weeds, sedimentation, and erosion during operations and address per the ESC Plan

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 19.2.1.18 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 19.2.1.18 Potential Decommissioning and Abandonment Phase Mitigation Measures for Soils

Potential Effect	Effect Pathways	Mitigation Measures
Change in soil quality and quantity	• Soil volume loss through wind/water erosion during re-grading and topsoil replacement • Compaction/rutting/loss of structure during vehicle/equipment movement or hauling • Admixing during re-grading/topsoil replacement and handling • Contamination through spills	• Store soil on-site until reclamation during decommissioning/abandonment. • Where topsoil segregation occurred, replace subsoil first, then uniformly spread topsoil over areas of removal. If multiple lifts were salvaged, restore them in original order to limit admixing.

Vegetation and Wetlands

The assessment includes the entire data center campus (i.e., Project and data center.

Effect Pathways

Construction

The site is predominantly cultivated, surrounded by cultivation and industrial land. Construction will clear natural vegetation and disturb wetlands; areas within the facility fence line will be graded. Table 19.2.1.19 summarizes effects and pathways.

Table 19.2.1.19 Potential Construction Phase Effects on Vegetation and Wetlands

Potential Effect	Effect Pathways
Change in vegetation communities and species	Direct loss/alteration of native communities or species of conservation concern due to clearing and ground disturbance
	Indirect changes via introduction and spread of weeds from materials and equipment/vehicle movement
Change in wetlands	Direct loss/alteration of wetland vegetation from clearing and disturbance
	Change in hydrological regime, storage capacity or overall function

Operation

Following completion of the facility construction, operations phase effects on native vegetation and wetlands are anticipated and will include vegetation management (i.e. weed control). Table 19.2.1.20 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 facility and ancillary infrastructure.

Table 19.2.1.20 Potential Operation Phase Effects on Vegetation and Wetlands

Potential Effect	Effect Pathways
Change in vegetation communities and species	Indirect changes through weed introduction and spread from vehicle/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 19.2.1.21 summarizes the potential effects and pathways that may occur.

Table 19.2.1.21 Potential Decommissioning and Abandonment Phase Effects on Vegetation and Wetlands

Potential Effect	Effect Pathways
Change in vegetation	Indirect changes via weed introduction and spread from vehicle/equipment movement

Potential Effect	Effect Pathways
communities and species	Increase in native vegetation area or species of conservation concern (including species at risk) through reclamation
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)

Mitigation

Construction

Mitigation measures to be implemented as appropriate during construction to address potential effects on native vegetation and wetlands are listed in Table 19.2.1.22 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 19.2.1.22 Potential Construction Phase Mitigation Measures for Vegetation and Wetlands

Potential Effect	Effect Pathways	Mitigation Measures
Change in vegetation communities and species	Indirect changes via weed introduction and spread from materials and equipment/vehicle movement	• Ensure all equipment/materials arrive clean and leak-free to reduce risk of weeds, pathogens, or contaminants. • Flag areas with known noxious/invasive weeds prior to site preparation. • Monitor topsoil windrows for weeds during non-frozen periods and implement corrective measures if needed. • Conduct weed monitoring, soil-pathogen testing, and control during construction/operation as required by the inspector. • Implement clean-up upon construction completion.
	Direct loss/alteration of native communities or species of conservation concern from clearing and disturbance	• Do not clear or grub beyond marked boundaries. • Use minimum-disturbance techniques where grading is unnecessary. • Reclaim temporarily disturbed areas per land-manager requirements (natural revegetation and/or seeding). • Cover exposed surfaces of permanently disturbed areas with mulch/stone or revegetate post-construction to limit invasive proliferation.
Change in wetlands	Direct loss and/or alteration of wetland vegetation arising from vegetation clearing and ground disturbance	• Minimize vegetation removal and disturbance in wetlands. • Direct any necessary dewatering to locations that avoid wetland effects. • Obtain Water Act approvals for wetlands to be graded/removed and any permanently impacted wetlands, including catchment changes; provide compensation per the Alberta Wetland Policy. • Mark boundaries of surrounding wetlands before clearing

Potential Effect	Effect Pathways	Mitigation Measures
		• Limit tree clearing to what is required • Retain stumps on slopes/around wetlands for stability (where possible) • Avoid laydowns within wetland boundaries unless required • Grade away from retained wetlands • Prefer natural recovery in temporarily disturbed wetlands.
Change in wetlands	Change in hydrological regime, storage capacity or overall function	• Prohibit refueling/washing within 100 m of wetlands. • Where rutting/admixing/compaction risk exists, apply protective layers (e.g., snow/ice, geotextile and fill, rig/swamp/access mats). • Use berms, cross-ditches, sediment fencing, or other measures to prevent erosion/siltation into adjacent wetlands. • Replace trench material promptly to restore cross-ROW drainage and pre-construction contours within wetland boundaries. • Maintain cross-drainage at temporary roads and pathways.

Following implementation of mitigation, construction will result in temporary to long-term residual adverse effects on native vegetation and wetlands where cleared or altered. Residual effects are reversible to irreversible (wetland loss) post-reclamation; permanent wetland impacts will be compensated under the Alberta 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.

19.3 Marine Environment

No adverse effects to the marine environment are anticipated as a result of Project activities. The Project is located entirely within inland Alberta and has no interaction with marine ecosystems.

19.4 Interprovincial Waters

No adverse effects to interprovincial waters, boundary waters, or international waters are anticipated. The Project will rely on municipal water supply and does not involve water withdrawals, diversions, or discharges that would affect interjurisdictional water bodies.

20. Summary of Federal Jurisdiction Considerations

The Project is 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 Extra-Provincial Lands

The Project is not anticipated to affect lands or interprovincial watercourses beyond Alberta or Canada. It is not situated on federal lands; however, Indigenous reserve lands are located nearby. Indigenous reserves within 50 km of the Project and their straight-line distances from the reserve boundary to the Project area are listed in Table 20.1.1, while reserves within are detailed in Section 3.1.5. The Project is not expected to have effects on lands or interprovincial watercourses outside of Alberta or Canada.

Table 20.1.1 Distance from the Project Footprint to Nearby Indigenous Reserves

Peoples	Distance (km)
ALEXANDER 134	45
ENOCH CREE NATION NO.135	47

Given the distance to nearby reserves, and based on the environmental effects analysis in Section 19.2, no changes to federal lands are expected. The closest reserves—Alexander 134 and Enoch Cree Nation No. 135—are located more than 45 km from the Project, and no Project-related pathways are anticipated that could result in adverse effects to federal lands.

Considering the Project's size and the localized nature of its potential effects on air quality, noise, geology, hydrogeology, surface water, fish and fish habitat, soils, vegetation, wetlands, and wildlife, no adverse environmental changes beyond Alberta are anticipated.

20.2 Federal Lands

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

21. Potential Impacts on Traditional Land Use, Physical and Cultural Heritage, and Historical, Archaeological and Paleontological Resources

21.1 Indigenous Land Use

The Project lies within Treaty 6 territory, in a region where several Indigenous groups may exercise Treaty and traditional rights. Heartland Power/Beacon identified the following groups as potentially interested in the Project:

> Alexander First Nation; Alexis Nakota Sioux Nation; Beaver Lake Cree Nation; Cold Lake First Nations; Enoch Cree Nation #440; Ermineskin Cree Nation; Frog Lake First Nation; Heart Lake First Nation; Kehewin Cree Nation; Louis Bull Tribe; Friends of Michel Society (former Michel Indian Band); Montana First Nation; O'Chiese First Nation; Onion Lake Cree Nation; Paul First Nation; Saddle Lake Cree Nation; Samson Cree Nation; Sunchild First Nation; Whitefish Lake Indian Reserve #128 (Whitefish (Goodfish) Lake First Nation); Buffalo Lake Métis Settlement; Kikino Métis Settlement; Lac Ste. Anne Métis Community Association; Métis Nation of Alberta - Otipemisiwak Métis Government.

The Project is located on privately owned land zoned for heavy industrial use, with extensive historical cultivation and limited natural vegetation (Sturgeon County 2017; AEP 2022a). As a result, the potential for current traditional land use, such as hunting, plant harvesting, or cultural practices, within the Project area is low.

While Indigenous land use may occur regionally, direct overlap with the Project area is expected to be limited and primarily restricted to temporary construction-related access constraints. Heartland Power/Beacon will continue engagement with Indigenous communities (IAAC 2024) to identify interests, gather input, and address concerns. Communication will continue during construction to avoid conflicts with land users where feasible.

Given land status, zoning, and existing industrial disturbance, no significant adverse effects to current use of lands and resources for Indigenous purposes are anticipated.

21.2 Historical Resources

The Project received a *Historical Resources Act* approval on December 05, 2025 (HRA Number: 4835-25-0120-001) by AACSW. Therefore, no residual effects on historical resources are anticipated. As with all projects regulated under the HRA, accidental or chance finds during construction or operation must be reported under Section 31 of the HRA (AACSW 2023b).

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

The Project is located on private agricultural land within the Industrial Heartland Designated Industrial Zone (DIZ) in Sturgeon County. As it does not affect constitutionally protected rights or traditional harvesting, no direct impact to Indigenous Peoples is expected. The DIZ framework streamlines approvals, supports economic development, and addresses cumulative industrial effects through participatory management. Recognizing Indigenous concerns about such effects, Heartland Power/Beacon actively engages in regional DIZ participation to minimise environmental impacts while promoting opportunities for both Alberta and Indigenous communities.

Heartland Power/Beacon has engaged with 23 First Nations, Indigenous communities, Métis Associations, and local representatives, with plans to continue engagement with the intent of collaboration throughout the Project's lifecycle. The organization is committed to building respectful, inclusive, long-term relationships, guided by the Truth and Reconciliation Commission's Call to Action #92. Heartland Power/Beacon aims to create employment, contracts, and economic participation opportunities for Indigenous peoples, actively identifying barriers and procurement options to ensure equitable access. The Indigenous participation program is central to Heartland Power/Beacon's social license within these traditional territories, emphasizing strategic cooperation for sustainable socio-economic outcomes. Where direct project related benefits may not exist for representative indigenous peoples, we will look for other socio-economic opportunities that can provide positive indirect benefit to indigenous peoples.

The environmental impacts of Project construction and operation on lands outside the Project area and within the IH-DIZ are anticipated to be negligible; therefore, effects on Indigenous peoples are also expected to be negligible. Environmental changes, including those affecting soil, vegetation, wildlife, and heritage resources, are expected to remain largely confined to the Project area, and the Project is not anticipated to affect the aquatic environment.

Heartland Power/Beacon acknowledge that the Project is within an area where Indigenous groups may exercise rights. Heartland Power/Beacon will continue engagement and, if potential effects are identified, will assess the need for additional mitigation. Effects on Indigenous peoples, including land use, socio-economic conditions, health, and cultural heritage, are expected to be negligible, given the Project's industrial zoning, private-land status, and low traditional-use potential.

Heartland Power/Beacon will continue Indigenous engagement and support long-term opportunities for economic participation.

23. Estimate Of Any 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 than operational emissions for most pollutants.

The CO_2 emissions are based upon engine manufacturer performance estimates conservatively assuming power output (800 MW_e), 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 23.1.1. Net Project GHG emissions are calculated consistent with equation 1 of the Strategic Assessment of Climate Change.

Table 23.1.1 Estimated Maximum Project GHG Emissions Associated with Operation

Pollutant	GHG Emissions (kilotonne/year)	GHG Emission Intensity (t/GWh)
CO_2	3004	

Pollutant	GHG Emissions (kilotonne/year)	GHG Emission Intensity (t/GWh)
CH_4	34.1	
N_2O	1.67	
CO_2e	4,401	628

Notes:
CO_2e 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 approximately 4,500 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.

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, or through offsets. Additionally, the Project has been designed with flexibility to allow for the integration of carbon capture and storage infrastructure in the future, including consideration of space allocation that could support future CCS (Carbon capture and storage). Heartland Power will monitor technological advancements to assess implementation of mitigation measures based on market conditions as well as regulatory frameworks to ensure operational compliance.

24. Types of Waste and Emissions Generated

The Project will generate air emissions (during construction, operation, and decommissioning/abandonment), noise emissions, surface runoff discharges, domestic wastewater, and general operational wastes.

24.1 Air

Air emissions associated with construction and operation of the Project will result from several sources (see Section 20.1.1 – Air Quality and Section 23 – GHG Emissions).

Particulate matter (PM) consists of solid particles and liquid droplets suspended in air. PM is characterized by particle size:

- *PM_{10} includes coarse dust particles between 2.5 and 10 microns in diameter, commonly generated through crushing, grinding, and vehicle movement on unpaved roads.*
- *$PM_{2.5}$ includes fine particles with diameters of 2.5 microns or smaller, often originating from combustion and certain industrial processes.*

During construction, fugitive dust and fine particulate emissions will be generated through land clearing, site preparation, grading, excavation, earth moving, and vehicle travel on unpaved areas. Off-road construction equipment (e.g., dozers, loaders, compressors) will emit combustion by-products such as NO_x, CO, and VOCs.

Fugitive dust emissions ($PM/PM_{10}/PM_{2.5}$) will be highest during early construction activities (clearing, stripping) and during peak periods of vehicle and equipment movement.

During operations, air contaminants will be generated primarily from natural gas combustion at the facility. Greenhouse gas emissions associated with the Project are provided in Section 23.

24.2 Noise

Noise emissions during construction will originate from stationary and mobile construction equipment. During operations, noise sources will include lean-burn natural gas engines and generator units, genset exhaust outlets, genset ventilation outlets, coolers, compressors, transformers, and other auxiliary equipment.

For a detailed description of potential noise pathways and mitigation, refer to Section 20.1.2 – Acoustic Environment.

A Noise Impact Assessment (NIA) was completed for the Project. The NIA determined that:

- *Predicted cumulative sound levels for both the Application Case and Foreseeable Application Case comply with AUC Rule 012 daytime and nighttime permissible sound levels (PSLs) at all receptors.*
- *Low-frequency noise effects are not expected at any receptors.*
- *The Project meets all requirements under AUC Rule 012.*

In the event of a noise complaint, Heartland Power will follow the AUC Rule 012 complaint resolution process (AUC 2024b), which includes timely investigation and may include completing a comprehensive sound survey under representative conditions.

Refer to Appendix C for the Noise Impact Assessment.

24.3 Liquid Discharges

Liquid discharges from the Project will include, 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).

Heartland Power 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.

24.4 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

All wastes will be stored in appropriate, labelled receptacles or containment areas and removed from site for disposal at licensed facilities in accordance with applicable regulations.

[1] This assessment includes the entire data center campus (i.e., Project and data center).

PART F - Summary

25. Plain-Language Summary

See attached documents for “IPD Summary English” and “IPD Summary – French”

26. References

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Appendices