Greenlight Electricity Centre Project
Application to the Alberta Utilities Commission

August 2025

Prepared for:
Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP.

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Limitations and Sign-off

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Acronyms / Abbreviations

AAAQO/G	Alberta Ambient Air Quality Objectives and Guidelines
ACO	Aboriginal Consultation Office
AEPA	Alberta Environmental Protected Areas
AESO	Alberta Electric System Operator
AUC	Alberta Utilities Commission
EE	environmental evaluation
EPEA	*Environmental Protection and Enhancement Act*
GECGP	Greenlight Electricity Centre GP Ltd.
GTG	gas turbine generators
HRA	Historical Resource Act
HRSG	Heat Recovery Steam Generators
IAA	*Impact Assessment Act*
IAAC	Impact Assessment Agency of Canada
IH-DIZ	Alberta Industrial Heartland – Designated Industrial Zone
IPD	Initial Project Description
LHV	lower heating value
NIA	Noise Impact Assessment
NO	nitrogen oxide
NO_2	nitrogen dioxide
NOx	oxides of nitrogen
PDA	Project Development Area
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter

Units of Measure

µg/m^3	micrograms per cubic metre
g/GJ	gram per gigajoule
GJ	gigajoule
GJ/h	gigajoules per hour
g/s	grams per second
ha	hectare
K	kelvin
kg	kilogram
kg/MWh	kilograms per megawatt-hour
kJ/kWh	kilojoules per kilowatt-hour
km	kilometre
kV	kilovolt
kW	kilowatt
m	metre
m/s	metres per second
MW	megawatt
MWh	megawatt-hour

Executive Summary

Greenlight Electricity Centre GP Ltd. (GECGP) is proposing to develop a 1864 MW (at full build out) combined cycle power generation facility that will feature four 1x1 gas/steam turbine line ups (units), utilizing H-class combined cycle gas turbines supplied with pipeline spec natural gas (the Project). The Project will leverage modern, high-efficiency industrial turbines fueled by natural gas and will capture waste heat to generate additional electricity via a steam turbine. With its strategic location, high-efficiency power generation, and future-ready infrastructure, the Project is positioned to be a cornerstone of Alberta's energy future—supporting the province's digital transformation and economic growth.

The Project is in the Alberta Industrial Heartland – Designated Industrial Zone (IH-DIZ) located on private land that is approximately 98 ha, of which, 65 ha is allocated for Project infrastructure and 33 ha are available for long term storage and workspace (the Laydown Area), collectively referred to as the Project Development Area (PDA). The Project is located within the northeast and southeast quarter sections of Section 10 Township 56 Range 22 W4M approximately 8.5 km east of Gibbons, Alberta in Sturgeon County. A portion of the southeast quarter sections of Section 10 Township 56 Range 22 W4M will be used for Laydown Area. The electricity produced will be put into the Alberta Provincial Grid to meet the electric power requirements of the province and to supply data centres.

Electricity generated by the Project will be stepped up to 240 kV using the generator step-up transformers and connected to the Project's switchyard located at the North side of the PDA. The switchyard will be interconnected to the AltaLink transmission system. AltaLink will permit and operate the transmission line and supporting infrastructure. Natural gas will be supplied from an existing pipeline network. The pipeline owner/operator will permit and operate the associated pipeline and supporting infrastructure.

GECGP is applying for the entire 1864 MW Project but intends to develop the Project in two phases. Phase 1 will be comprised of two 1x1 gas/steam turbine line utilizing combined cycle gas turbines for a total capacity of 932 MW. Phase 2 will be comprised of another two 1x1 gas/steam turbine line utilizing combined cycle gas turbines for a total capacity of 1864 MW. Full buildout is expected to be completed by 2030 and fully operational in 2031.

The Project is expected to deliver meaningful socioeconomic benefits to local communities such as Sturgeon County, by providing employment opportunities, provide additional sources of revenue to Sturgeon County, and provide local power to industry developers in the IH-DIZ.

This application has been prepared in accordance with Alberta Utilities Commission (AUC) Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Developments and Gas Utility Pipelines (AUC 2024). GECGP is seeking approval for the thermal power plant and associated equipment (generator step-up transformers and switchyard) (the Project).

Project Description

TP1 Approvals and Power Plant Summary

Greenlight Electricity Centre GP Ltd. (GECGP) is applying to the Alberta Utilities Commission (AUC) pursuant to Section 11 of the *Hydro and Electric Energy Act* (RSA 2000, c. H-16) for approval of a new power plant. This application has been prepared in accordance with Alberta Utilities Commission (AUC) Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Developments and Gas Utility Pipelines (AUC 2024). GECGP is seeking approval for the thermal power plant and associated equipment (generator step-up transformers and switchyard) (the Project).

The Greenlight Electricity Centre Project is a combined cycle thermal power plant that will feature four highly efficient SGT6-8000H gas turbines generators (GTG) in single shaft combine cycle configuration, supplied with pipeline spec natural gas. Each GTG can produce a total output of 466 MW. At full build out, the power plant will generate a total plant output of 1864 MW. Natural gas will be supplied from a pipeline tied to an existing natural gas distribution network. The Project will require up to 297,272 GJ per day of pipeline spec natural gas as fuel, with an estimated net plant efficiency between 55-65%. The waste heat from the gas turbine exhaust will be utilized in Heat Recovery Steam Generators (HRSG) to produce steam that will ultimately power the steam turbine. In addition to the power generating components, the balance of plant will consist of fuel gas treatment components, generator step-up transformers, associated power distribution modules, and the demineralized water treatment facility with associated storage tanks.

The Project will produce reliable baseload electricity supplied to the Alberta Interconnected Electric System to meet the power requirements of the province and to supply data centres. The Project will connect to the Alberta Interconnected Electric System via a substation connection with 240 kV transmission lines. Make-up water, required for the steam cycle, will be municipal water sourced locally from Sturgeon County. Other components of each power train include an air-cooled condenser and a generator step-up transformer.

The Project will address Alberta’s increasing energy demand, particularly from the rapid growth of the data centres. This demand surge is driven by advancements in artificial intelligence, cloud computing, and digital transformation, with global data centre electricity consumption projected to double by 2027, reaching 2.6% of global electricity usage. The Project is expected to deliver meaningful socioeconomic benefits to local communities such as Sturgeon County, by employing approximately 1500 workers during the peak of construction and more than 40 direct, long-term skilled jobs created once operations commence. The Project will be an additional source for the local municipality tax base, additional jobs through third party vendors, and maintenance workers.

The power plant boundary is located within NE-10-056-22-W4M (see Plot Plan in Appendix A). GECGP is currently refining Project engineering design and only minor changes in equipment or layout are anticipated. The Project Development Area (the PDA) is within NE-10-056-22-W4M and the north half of SE-10-056-22-W4M. Legal subdivisions 07-10-056-22-W4M and 08-10-056-22-W4M will be used for long term storage and workspace (Laydown Area). See Attachment TP6 for figures.

Any changes to equipment are anticipated to stay within the outlined allowances of AUC. A final Project update will be provided to the AUC at least 90 days before the start of construction.

TP2 Existing Approvals

Not applicable. There are currently no existing facilities directly affected by this Project.

Table 1 summarizes the applications and/or approvals that are required for the Project.

Table 1 Associated Approvals

Act	Application Type	Date	Permit/approval number/status
Electric Utilities Act	Alberta Electric System Operator (AESO) interconnection	The original System Access Service Request for the first unit was submitted to the AESO on January 13, 2022	The Project is in Stage 3 of the AESO Interconnection Process and have the following asset identification codes assigned: Unit 1 – P2533 Unit 2 - P2796 Unit 3 – P2797 Unit 4 - TBD
Historical Resources Act	Historical resource application field with	July 10, 2025	An HRA approval (4940-25-0046-001) has been issued for the Project as of July 10, 2025 with standard schedule of conditions
Impact Assessment Act	Initial Project Description (IPD)	IPD submitted July 31, 2025 Detailed Project Description will be submitted in September 2025	IPD is currently in review with the Impact Assessment Agency of Canada (IAAC). The Detailed Project Description is in development.
Water Act	Water Act Approval - Wetland Disturbance	September 2025	A Water Act approval is being prepared and is anticipated to be submitted in Q3 2025.
Municipal Development Act	Sturgeon County Land Use Bylaw 1313 Municipal Development Permit	Anticipated to be submitted in Q1 2026.	In development.

TP3 Project Ownership, Structure and Interests

The Project is owned and operated by GECGP, a subsidiary of 50% Pembina Pipeline Corporation and 50% Kineticor Holdings Limited Partnership #3. GECGP, as the applicant, is the qualified owner.

TP4 Municipal Interests

Not applicable to the Project; no municipality will hold an interest in the Project.

TP5 Location of the Project

The Project is located in the IH-DIZ in an area approximately 98 ha in size and is in the following legal subdivisions:

- 15-10-056-22-W4M
- 16-10-056-22-W4M
- 10-10-056-22-W4M
- 09-10-056-22-W4M
- 07-10-056-22-W4M
- 08-10-056-22-W4M

All Project components are located within the province of Alberta.

A plot plan is provided in Appendix A. All major components, including the Project boundaries and major equipment is provided as a Keyhole Markup Language File (.kml/.kmz) included as Attachment TP5.

The connection point is still being determined by GECGP and AltaLink. See TP10 for more information on the connection order and transmission system.

TP6 Drawings and Maps

The following are provided in Attachment TP6 :

- Figure 1: Project Layout
- Figure 2: Project Overview
- Figure 3: Project Environmental Sensitivities
- Figure 4: Land Use

TP7 Heat Rates, Efficiency and Cooling Systems

The estimated heat rate for the Project is provided in Table 2. Based on the heat rate of 6,250 kJ/kWh lower heating value (LHV) at 100% loading, the efficiency of the Project is 58% LHV. The Project includes an air cooled condenser as its cooling system.

Table 2 Proposed Facilities Capacity

Capacity Items	Natural Gas Capacity Values
Gross Power Output (Nominal) (ISO @EI. 935 meters)	920,000 kW
Maximum Gross Energy Output	8,000,000 megawatt/hour/year
Heat Rate, LHV (efficiency)	6,307 kJ/kWh (gross value LHV)
Natural Gas Consumption	2,886 GJ/h (LHV)

Note:
Assumed 8000 operating hours annually

TP8 Associated Pipelines

The Project will be connected to an existing natural gas pipeline network that will supply the Project with pipeline spec natural gas. The pipeline owner/operator will permit and operate the associated pipeline and infrastructure for the Project.

The pipeline will operate in accordance with applicable requirements pertaining to Alberta Boilers Safety Association Canadian Standards Association Z662, the Pipeline Rules, and Alberta Energy Regulator Directive 056.

TP9 Project Schedule

The Project is expected to have a commercial life of approximately 30 years. Construction will start after all permits and approvals are acquired. Currently, construction of the Project is expected to begin in Q3 2026, with commissioning Q3 2029 and an in-service date of Q1 2031. Table 3 provides an outline of planned key dates associated with the Project.

GECGP is requesting an approval date of December 1, 2025. If the Project is not be approved in a timely manner it may cause delays to the construction schedule, include potential breaches of obligations regarding equipment and key commercial contracts that underpin the Project economics.

Table 3 Schedule

Date	Project Phase
Q2-Q3 2025	Field surveys and technical studies
Q3 2025 – Q1 2026	Permits and approval applications
Q2 2025 – Q2 2027	Detailed engineering and procurement
2026 – 2030	Construction
Q3 2029	Start up / commissioning
Q1 2031	In service
2060-2062	Project decommissioning and abandonment (after estimated 30-year life)

Note:

Phase 1 construction is anticipated to begin in Q3 2026. Phase 2 of the Project is anticipated to begin in Q3 2027.

Project Connection

TP10 Connection Order

The Project is currently in Stage 3 of the AESO Interconnection Process. The Functional Specifications have been developed, as has the Engineering Connection Assessment. However, due to the interconnected relationship with a proposed data centre that the power plant intends to tie into, the Functional Specification for the generation units cannot be finalized until the load studies for the data centre have been completed. A combined technical solution is required to address the overall development. The data centre project is currently in Stage 2 of the Interconnection Process and is anticipated to move to Stage 3 concurrent with the signing of the Direct Transmission System contracts Sept 15, 2025. Two different connection solutions are currently being assessed for the combined project, Once the Functional Specification is finalized, the AESO will issue Direction Letters, which will allow AltaLink to complete their consultation process and finalize their Facilities Application to the AUC. The AESO will also prepare and submit their Needs Identification Document application to the AUC. Filing of the Needs Identification Document and Facilities Application is anticipated for late Q1 of 2026, which will be the final deliverable for the Project to move to Stage 4 of the Interconnection Process.

Once a connection solution has been chosen, an interconnection diagram can be provided.

TP11 Asset Identification

The Project is in Stage 3 of the AESO Interconnection Process and have the following asset identification codes assigned:

- Unit 1 – P2533
- Unit 2 - P2796
- Unit 3 – P2797
- Unit 4 – To be determined

TP12 Transmission System

The transmission facility owner (AltaLink) will provide more details and maps as part of their transmission facility application process.

A single line diagram is provided in Appendix B.

Emergency Response

TP13 Corporate Emergency Response Plan

A site-specific emergency response plan will be developed prior to construction of the Project.

TP14 Project Risk and Emergency Response Measures

GECGP is currently developing a Project specific emergency response plan and will complete and submit the emergency response plan to applicable agencies and local authorities prior to operation. The emergency response plan will include site specific and emergency mitigation measures as well as monitoring and communication protocols.

TP15 Local Responders

Local public services, including responders within Sturgeon County have been notified of the Project as part of the engagement and consultation process. GECGP will develop the Project emergency response plan in conjunction with emergency responders. As the Project progresses these groups will continue to be consulted on services required.

Environmental Information

TP16 Emissions Standards

Emission sources for the Project include four Siemens SGT6-8000H gas turbine-equipped with ultra-low oxides of nitrogen (NOx) burners and four HRSGs equipped with natural gas fired low NOx duct burners. The hot exhaust gases from the gas turbines are used to produce steam. The steam is used to generate electricity in four steam turbines. The Project will be equipped with a selective catalytic reduction system to further reduce NO_X emissions. There are no substantive emissions of sulphur dioxide, as the Project uses pipeline quality sweet natural gas.

Table 4 provides a summary of stack parameters and emission rates for the Project emission sources. Emission rates were estimated based on the GTG performance data sheet provided by GECGP (GECGP 2025) including duct firing to achieve increased power generation. The NOx emission rate of 46.6 kg/h (12.9 g/s) is based on an emission intensity of 0.1 kg NOx per MWh (net power output). The carbon monoxide (CO) and particulate matter 2.5 microns or less in diameter ($PM_{2.5}$) emission rates are the maximum emission rates from the GTG performance data sheet provided by GECGP (GECGP 2025).

The NO_X emissions from the Project are subject to provincial and federal emission standards for new electricity generation facilities. Table 5 shows provincial and federal emission criteria for new turbines along with emissions from the Project gas turbines plus HRSGs in equivalent units. Project emissions are estimated to meet federal and provincial emission standards for new electrical generation facilities.

Table 4 Stack Parameters and Emissions for the Greenlight Electricity Centre

Source		**Siemens SGT6-8000H GTG and HRSG 1**	**Siemens SGT6-8000H GTG and HRSG 2**	**Siemens SGT6-8000H GTG and HRSG 3**	**Siemens SGT6-8000H GTG and HRSG 4**
Model ID		HRSG1	HRSG2	HRSG3	HRSG4
Period of Operation		Continuous	Continuous	Continuous	Continuous
Power Rating [a]	kW	466,000	466,000	466,000	466,000
Fuel Type		Sweet Natural Gas	Sweet Natural Gas	Sweet Natural Gas	Sweet Natural Gas
Stack Location [b]					
UTM Easting	m	356,763	356,626	356,425	356,288
UTM Northing	m	5,966,624	5,966,628	5,966,635	5,966,639
Base Elevation [c]	m	646.0	646.0	646.8	647.0
Stack Parameters					
Stack Height	m	60.0	60.0	60.0	60.0
Stack Inside Diameter [d]	m	6.56	6.56	6.56	6.56
Exit Temperature [e]	K	346.6	346.6	346.6	346.6
Exit Velocity [f]	m/s	18.1	18.1	18.1	18.1
Emission Rate					
NO_X	g/s	12.9	12.9	12.9	12.9
CO [g]	g/s	8.2	8.2	8.2	8.2
$PM_{2.5}$ [g]	g/s	4.7	4.7	4.7	4.7

Notes:

[a] Power rating is the combined net electrical power rating per train based upon power output from each Siemens SGT6-8000H GTG and the total power generated by the steam turbines. All parameters provided by GECGP.

[b] Based on Project site plot plan provided by GECGP (UTM NAD 83, Zone 12).

[c] Extracted based on the Canadian Digital Elevation Model database (NRCan 2016).

[d] Based on stack drawings provided by GECGP.

[e] Based on stack exit temperature from the GTG performance data sheet provided by GECGP (GECGP 2025).

[f] Calculated based on the stack flow rate from the GTG performance data sheet provided by GECGP (GECGP 2025).

[g] Based on the maximum emission rates from GTG performance data sheet provided by GECGP (GECGP 2025). The total of particulate emission rate (front) and particulate emission rate (front and back half) was assumed to be equal to the $PM_{2.5}$ emission rate (GECGP 2025).

Table 5 Comparison of Project NO_X Emissions with Provincial and Federal Emission Limits for New Electricity Generation Facilities

Regulatory Jurisdiction	Substance	Reference	Units	Emission Limits (for each new generating unit)	Equivalent Project Emission Rate (GTG and HRSG)
Provincial	NO_X	AEP (2005) [a]	kg/MWh	0.3 [b]	0.1 [d]
Federal	NO_X	Environment and Climate Change Canada (ECCC 2017)	g/GJ	85 [c]	27.8 [d]

Notes:

[a] AEP emission standard applies to net power or heat output.

[b] Emission standards for new natural gas fired generating units greater than 60 MW.

[c] Federal emission limits for non-peaking turbines greater than 70 MW capacity per GJ of power output.

[d] Calculated based upon combined net electrical power output from the gas and steam turbine generators.

TP17 Alberta Air Quality Standards and Guidelines

Ambient air quality as a result of the Project is assessed by comparing measured or predicted concentrations to objectives and standards. Alberta Environmental Protected Areas (AEPA) has established Alberta Ambient Air Quality Objectives/Guidelines (AAAQO/G) for a number of substances. They are referred to as AAAQO/G (AEPA 2024).

The Project is a source of NOx, CO and $PM_{2.5}$. Oxides of nitrogen are produced in most combustion processes and are almost entirely made up of nitrogen oxide (NO) and nitrogen dioxide (NO_2). Together they are often referred to as NOx. Nitrogen dioxide is a respiratory irritant, while NO is relatively inert. As such, regulatory ambient air quality objectives exist for NO_2, and not for NO or NOx. Table 6 presents the relevant AAAQO/G.

Dispersion modelling has been completed based upon the conservative assumption that all turbines operate continuously at the maximum rated capacity for each combined cycle system with all exhaust exiting through the HRSG stacks. Based on the results of dispersion modelling the maximum predicted ground-level concentrations for all substances of interest associated with emissions from the Project (the Project alone) are below the AAAQO/G for all relevant averaging periods (ranging between 0.1% and 15% of the AAAQO/G).

Table 6 Maximum Predicted Ground-level Concentrations (µg/m^3) Associated with the Project

Substance	Averaging Period	Maximum Predicted Ground-Level Concentrations (µg/m^3)	AAAQO/G (µg/m^3)	Comparison of Predictions to AAAQO/G
NO_2 (TCM) [a]	1-hour [b]	28.8	300	10%
	Annual	0.838	45	2%
NO_2 (ARM2) [c]	1-hour [b]	25.9	300	9%
	Annual	0.754	45	2%
CO	1-hour [b]	18.2	15,000	0.1%
	8-hour	15.7	6,000	0.3%
$PM_{2.5}$	1-hour [b]	10.5	80	13%
	24-hour	4.35	29	15%

Notes:

[a] 100% of the NO_X concentrations are converted to NO_2 (Total Conversion Method (TCM)).

[b] 9th highest predictions (AEP 2021).

[c] NO_X was converted to NO_2 using the ARM2.

TP18 AEPA Recommendations and Requirements

An *Environmental Protection and Enhancement Act* (EPEA) application will be submitted on the same timeline as this application; as such, no feedback on the Project EPEA application has yet been received.

TP19 Emissions Modelling

A copy of the Air Quality Assessment Report that was prepared for the EPEA application to AEPA is available in Appendix C.

TP20 Environmental Evaluation

Section 30 of the *Impact Assessment Act* (2019) Physical Activities Regulations stipulates that “the construction, operation, decommissioning and abandonment of a new fossil fuel-fired power generating facility production capacity of 200 Megawatts or more,” is a designated project to which the *Impact Assessment Act* applies. IAAC has established a process for its review of projects that fall under the Physical Activities Regulation to determine if an impact assessment is required.

GECGP submitted an Initial Project Description on July 31, 2025 and is currently preparing a Detailed Project Description. Upon submission, GECGP will await feedback from the IAAC.

The Project is listed under the EPEA Physical Activities Regulations as a “power plant”, where a plant that has a rated peak production output of greater than one megawatt under peak load. However, the Project does not represent an activity that is listed in the Environmental Assessment (Mandatory and Exempted Activities) Regulation (Alberta Regulation 111/1993). Therefore, the Project will require an approval issued under EPEA, but an environmental impact assessment is not mandatory under the EPEA. GECGP has submitted a request for review for the Project to determine if an environmental impact assessment will be required.

An environmental evaluation (EE) was prepared (Appendix D) for this Project. The EE describes the present environmental conditions, identifies Project activities and infrastructure, discussed specific ecosystem components, describes potential adverse effects of the Project, proposes mitigation measures, identifies predicted residual effects of the Project and their significance and describes proposed monitoring programs. Technical Data Reports for Soils, Vegetation and Wetlands, and Wildlife are appended to the EE.

TP21 Federal Lands

The Project is not located on federal lands and is not expected to cause effects to another jurisdiction.

TP 22 Environmental Protection Plan

The Project specific environmental protection plan is provided in Appendix E.

End-of-Life Management and Reclamation Security

TP23 Reclamation Security

GECGP has completed an estimate of funds required for decommissioning and reclamation. The estimate is provided in Appendix F and interim reclamation security questions are provided in the Interim Requirements Section.

Noise

TP24 Noise Impact Assessment

Noise effects from the Project were assessed at the nearest receptor (R1) that is approximately 860 m from the Project boundary. The Permissible Sound Levels for R1 were determined according to the AUC Rule 012: Noise Control (Rule 012) requirements (AUC 2021). The modeling results indicate that the predicted cumulative sound levels are below the daytime and nighttime permissible sound levels at R1. Also, based on AUC Rule 012 prescribed approach, low frequency noise effect is not expected at R1. The NIA concludes that the Project complies with the AUC Rule 012 requirements.

A copy of the Noise Impact Assessment (NIA) is provided in Appendix G.

Approvals, Reports and Assessments from Other Agencies

TP25 Other Acts and Approvals that Apply to the Project

Electric Utilities Act

The AESO manages and operates the provincial power grid as the Independent System Operator designate pursuant to Part 2 of the *Electric Utilities Act.* The purpose of the *Electric Utilities Act* is to provide a competitive power pool so that an efficient electricity market based on fair and open competition can develop and to proved for rules in which the market is supplied. The Project is in Stage 3 of the AESO Interconnection Process (P2533, P2796 and P2797).

Environmental Protection and Enhancement Act

The Project is listed under the EPEA Physical Activities Regulations as a “power plant”, where a plant that has a rated peak production output of greater than one megawatt under peak load, therefore the Project requires an EPEA approval. An application to AEPA under the Guide to Content for Industrial Approval Applications (AEPA 2014), Part 1: New Plants and Facilities was submitted concurrently with this application. GECGP anticipates a decision from AEPA in the next 6-8 months. Given that the Project is located within the IH-DIZ, the Industrial heartland designated industrial zone directive: standard conditions (GOA 2022) will apply. This directive is intended to improve regulatory consistency and achieve targeted environmental outcomes, in part through standardized approval conditions under EPEA.

Water Act

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

Development affecting wetlands and water bodies is regulated under the *Water Act*. Effects on wetlands associated with long-term disturbance of topography or hydrology of wetlands, such as those caused by the construction of above-ground facilities or permanent access roads, require approvals under the *Water Act* from the authorizing regulator before construction via a *Water Act* Application supported by a Wetland Assessment Impact Report.

A *Water Act* application for *Water Act* Approval - Wetland Disturbance and will be accompanied by a Wetland Assessment and Impact Report. The application is anticipated to be submitted in Q3 2025.

Public Lands Act

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

The PDA is located on private land and, therefore, the *Public Lands Act* is not applicable.

TP26 Historical Resources

Heritage resources are regulated under the Alberta *Historical Resources Act* (HRA) and administered by the Historic Resources Management Branch of Alberta Arts, Culture and Status of Women. The need for, and scope of, heritage resource assessments is determined by the Historic Resources Management Branch based on their guidelines and requirements. the Historic Resources Management Branch independently evaluates the scientific value of heritage resource sites and determines the need for mitigation including avoidance measures. The Heritage Division of Alberta Arts, Culture, and Status of Women has issued *Historical Resources Act* approval (HRA4940-25-0046-001) with the condition that Kineticor submit a final plan with ESRI shapefiles to the Heritage Division prior to the onset of development activities.

See Appendix H for HRA approval.

TP27 Aboriginal Consultation Office Assessment

An Aboriginal Consultation Office (ACO) determination of Indigenous engagement requirements was submitted on May 10, 2023. The ACO pre-consultation assessment determined that no consultation was required. The ACO Determination is provided in Appendix I.

Participant Involvement Program

TP28 Participant Involvement Information

GECGP has developed an engagement plan for the Project that includes outreach to Indigenous groups and stakeholders comprised of residents in the area, as well as industry and stakeholder groups, consistent with the AUC notification radius for thermal power plants (a minimum 2,000 m radius for thermal power plants >10 MW). As part of the engagement plan, GECGP has issued letters of introduction to the Indigenous groups and stakeholders. The letter introduced GECGP, provided a high-level description of the Project, and invited groups to meet with the Project team. Included with the letter is a Project newsletter, see Attachment TP28, that provides general Project information including a Project schedule. Two open houses were also conducted; details are provided in TP29. Participant involvement information is provided in Attachment TP28.

TP29 Notified Stakeholders

A list of all occupants, residents, and landowners on lands within the appropriate notification radius of 800 m and 3,000 m and their contact information is provided in the Stakeholder List in Attachment TP28.

A summary of stakeholder and indigenous notifications is provided below.

Introductory Letters and Responses

Introductory packages were sent via email or regular mail in July 2023 to Indigenous groups and landowners located within a 3 km radius of the PDA. The package introduced GECGP, provided a high-level description of the Project, and invited groups to meet with the Project team. Of the landowners contacted, GECGP received no responses.

GECGP has coordinated two Project Summary Information Package mail outs since April 2025.

In April 2025, the first Project Summary Information Package was issued to stakeholders with Project related information and an invitation to attend the open house held in June 2025. The following information was included in the Project Summary Information Package to stakeholders:

- An introductory cover letter from the Project's lead developer;
- A Project Information Brochure with an overview of the Proponent, the Greenlight Power Project, including details on the proposed facility, its potential benefits to both the local and provincial economy, and GECGP's approach to responsible development;
- An invitation to the June 2025 open house; and
- AUC brochure titled Public Involvement in a Proposed Utility Development.

In July 2025, the second Project Summary Information Package was issued to stakeholders by email with the following information:

- An introductory cover letter with a Project update
- Spring 2025 Newsletter
- July 2025 Update
- AUC Brochure

Site Visits and Open Houses

GECGP hosted the first Project Open House on July 26, 2023, and the second on June 26, 2025. No representatives from the notified Indigenous groups attended the July 2023 or June 2025 Open House. To inform the public of the open house, advertisements were placed on the Sturgeon County website on June 20, 2025. The advertisement included information about the Project and the date, time, and location of the Open House and were issued to the following stakeholders:

- County representatives
- Landowners
- Industry representatives
- Indigenous groups

TP30 Project Contacts

A spreadsheet of the individuals and organizations contacted as part of the Participant Involvement Program is provided in Attachment TP30.

TP31 Consultation with Local Jurisdictions

Consultation with relevant federal and provincial ministries and agencies, local jurisdictions, industry, and special interest groups began in April 2025. Project consultation materials were tailored to the stakeholders and emailed to the appropriate contact person within each organization. Comprehensive record of engagement with local jurisdictions is available in Attachment TP28.

TP32 Consultation Results

A log of all specific concerns, steps taken to resolve the concerns and status of concern resolution from landowners, occupants, residents, local jurisdictions, and Indigenous groups is available Attachment TP28.

Interim Requirements

The following sections describe the Rule 007 interim information requirements as set out in Bulletin 2024-25 for thermal power plants.

Agricultural Land

1. ***Using the current version of the Agricultural Regions of Alberta Soil Inventory Database (AGRASID), please describe the agricultural capability of soils intersecting the project footprint as provided in the spring-seeded small grains (SSSGRAIN) attribute of the Land Suitability Rating System (LSRS) table. Provide a table showing the amount of area for each LSRS class impacted by the project in hectares (e.g., 80 hectares of Class 2).***

The agricultural capability of soils intersecting the PDA and land suitability rating is described in Appendix B of the EE (Appendix D). In summary, a majority of soils within the PDA were rated to have Class 2 agricultural land capability, occupying approximately 87.6 ha or 89.3% of the PDA. Table 7 shows the amount of area for each LSRS class impacted by the Project in hectares.

Table 7 Agricultural Land Capability Class for Soils within the PDA

Agricultural Land Capability Class	Subclass	Subclass Area (ha)	Subclass Area (%)	Class Area (ha)	Class Area (%)
2 - Slight limitations that might restrict the growth of the specified crops or need modified management practices.	2CD	3.6	3.7	87.6	89.3
	2CDMV	3.0	3.0		
	2CDV	80.4	81.9		
	2CMD	0.2	0.2		
	2WDCV	0.5	0.5		
3 - Moderate limitations that restrict the growth of the specified crops or need special management practices.	3WDC	0.9	0.9	6.4	6.6
	3WDCMV	1.8	1.9		
	3WDCV	3.7	3.8		
6 – Extremely severe limitations for sustained production of the specified crops. Extremely severe limitations for sustained production of the specified crops. Annual cultivation is not recommended, even occasionally.	6WDC	3.4	3.5	3.4	3.5
[1]Not Rated	-			0.6	0.6
Total		**98.1**	**100.0**	**98.1**	**100.0**

Notes:

Source: AAFC 1995

[1]Not rated includes disturbed land (ZDL) and open water (ZWA) SMUs.

2. For the project footprint, identify whether:

a) The project lands contain irrigation infrastructure.

b) The project lands are within an irrigation district. If so, whether:

- ***The project has been discussed with the applicable irrigation district.***
- ***Irrigation acres (either permanent, terminable or annual) are or have been assigned to the project lands.***
- ***An application for water rights or irrigation acres has been made for the project lands.***

c) The landowners have obtained a Private Irrigation Water Licence for irrigating the project lands.

The PDA does not contain irrigation infrastructure and is not within an irrigation district. The landowners have not obtained a private irrigation water license for irrigating the Project lands.

3. List the professional qualifications of the author(s) who prepared or reviewed the above information regarding agricultural land.

The following professionals prepared and reviewed the agricultural information associated with the AUC application.

Table 8 Professional Qualifications of Authors of the Application Agricultural Information

	Prepared Soils Information Associated With The Application	**Reviewed Soils Information Associated With The Application**
Name:	Kathleen Meszaros	Melvin Zwierink
Title:	Environmental Scientist	Senior Reclamation Specialist
Qualifications:	Master of Science in Ecological Restoration Simon Fraser University 2021 Registered Professional Biologist – BC College of Applied Biologists, BC Member #4107 Articling Agrologist – BC Institute of Agrologists Member #4855	Certified Professional in Erosion and Sediment Control, EnviroCert International, Inc. Member #4073 Professional Agrologist - AB Institute of Agrologists Member #1264 Professional Agrologist - BC Institutes of Agrologists Member #977 Registered Professional Forester – Association of BC Forest Professionals Member #3008
Professional Service:	Summarizing baseline surficial soil characteristics for proposed Greenlight power plant on agricultural land under senior guidance. Includes analyzing field data, risk assessments (erosion, compaction, rutting), assigning agricultural capability, mapping soils and completing Project effects assessment	Quality review and senior support for summary of baseline surficial soil characteristics of proposed Greenlight power plant

4. Visual impact assessment

The Project does not fall within a viewscape or visual impact assessment zone and therefore no visual impact assessment is required.

Municipal Land Use

1. Confirm whether the proposed power plant or energy storage facility complies with the applicable municipal planning documents including municipal development plans, area structure plans, land use bylaws and other municipal bylaws.

The Project will comply with Sturgeon County bylaws and municipal development plans. Table 9 outlines applicable bylaws or development plans applicable to the Project.

Table 9 Municipal Regulatory Requirements

Bylaw or Policy	Description	Applicability to the Project
Sturgeon County Municipal Development Plan Bylaw #1313/13 (Sturgeon County 2014)	The Plan is intended to provide a long-range planning vision for the future growth of the municipality, focusing on land use, but also guiding social, cultural, environmental, economic and infrastructure factors.	GECGP has confirmed with Sturgeon County that the Project will comply with Bylaw #1313/13 and a development permit application is in development.
Sturgeon County Land Use Bylaw 1385/17 (Sturgeon County 2017)	The purpose of this Bylaw is to regulate and control the use and development of land and buildings within Sturgeon County.	GECGP has confirmed with Sturgeon County that the Project will comply with Bylaw #1385/17 and does require a development permit.
Alberta's Industrial Heartland Area Structure Plan Bylaw 1118/07 (Sturgeon County 2007)	The purpose of Alberta's Industrial Heartland Area Structure Plan is to review and update ASP Bylaw No. 900/00 in accordance with Sturgeon County's Terms of Reference.	GECGP has confirmed with Sturgeon County that the Project will comply with Bylaw #1118/07 and does not require any further application.

2. Identify any instances where the proposed power plant or energy storage facility does not comply with applicable municipal planning documents and provide a justification for any non-compliance.

Per Table 9, the Project complies with all applicable municipal planning documents.

3. ***Describe how the applicant engaged with potentially affected municipalities to modify the proposed power plant or energy storage facility or to mitigate any of its potential adverse impacts to the municipality, prior to filing the application.***

Consultation with relevant municipal jurisdictions, including Sturgeon County, Town of Gibbons, and Strathcona County began in July 2025. Project consultation materials were tailored to the municipalities and emailed to the appropriate contact person within each organization.

The notification packages included:

- An introductory cover letter with a Project update;
- Spring 2025 Newsletter with open house invite;
- July 2025 Project Update; and
- AUC brochure titled Public Involvement in a Proposed Utility Development.

Comprehensive record of engagement with local jurisdictions is available in Attachment TP28.

Reclamation Security

Reclamation security was discussed in TP23.

The standard to which the project site will be reclaimed to upon decommissioning.

It is anticipated that the powerplant will be demolished and salvaged as a single project at the time that the last unit at the site is retired. No interim demolition, reclamation, or salvage activities will occur during operation of any single unit. Demolition will include the removal of all above grade structures, tanks, ancillary buildings, and other infrastructure on the site. Upon completion of site reclamation and establishment of the proposed vegetation cover, wildlife habitat is expected to return to conditions equivalent to pre-disturbance. The PDA will be graded to achieve suitable site drainage for natural drainage patterns. Grading will include actions to replace stripped subsoils and topsoil, revegetate, and manage weeds.

How the amount of the reclamation security will be calculated.

A preliminary demolition and reclamation study was completed by WSP Canada Inc. (WSP Canada Inc. 2025) in accordance with the Advancement of Cost Estimating guidance and literature (see Appendix F). The developed estimate is a high-level estimate, completed primarily utilizing in house curated unit rates, and buildups from the catalogue of projects WSP has completed with similar site uses and geographic locations. Currently, there are no detailed design drawings for the Project. The frequency with which the reclamation security amount will be updated or re-assessed.

When the reclamation security will be in place to be drawn upon, if needed.

Reclamation security will be in place, proportionately, over the life of the Project. The reclamation security will be based upon a 30-year operating life for the Project. GECGP will require that the entire balance of the costs associated with decommissioning and reclamation activities be fully funded by the time the plant's end-of-life has occurred, and decommissioning activities are required to commence.

What form the reclamation security will take (e.g., letter of credit, surety bond, other).

Currently, GECGP has two forms of security proposed. GECGP is currently in the process of evaluating the most efficient form of financing, which has been narrowed down to the following two options, both are designed to provide access to the same balance of funding/security required as outlined under the demolition and reclamation study:

- *Option 1 – Restricted Cash Contributions*: Upon the commercial operation date, GECGP will create a "Reclamation Holdback" account with ATB Financial which, using cash flows from operations, will make contributions to this account in consistent intervals (i.e. monthly/quarterly/annually) in equal installments. These restricted cash contributions will be made at the end of year 30, the plant's current proposed end-of-life timeline. There will be the full value of the demolition and reclamation estimated posted as security. The funds held in this restricted cash account will be invested in de-risked investment products such as GICs and/or high-yield savings which will assist in generating additional cash flows over the life of the plant's operations.
- *Option 2 – Letter of Credit Facility:* GECGP will obtain a letter of credit facility which will have the Alberta Utilities Commission named as beneficiary. Upon the commercial operation date, GECGP will increase the letter of credit by $5,090,000 every 5 years, whereby, at the end of year 30, the plant's current proposed end-of-life timeline, there will be the full value of the demolition and reclamation estimate posted as security.

The security beneficiaries to whom the reclamation security will be committed.

- *Option 1 – Restricted Cash*: The account holder will be the current landholder, which will provide the necessary funding for all required reclamation activities as outlined in the demolition and reclamation study completed. Given that the Reclamation Holdback account will be considered restricted funds, these funds will only be accessible for any and/or all activities pertaining to demolition and reclamation of the site. These funds will not be accessible for operating expenditures and/or distributions. Terms and conditions will be outlined by which the only way these funds can be used and cannot otherwise be accessed.
- *Option 2 – Letter of Credit*: Beneficiary will be listed as the AUC to provide sufficient guarantees that the balance of required when the plant is decommissioned and the reclamation activities have commenced.

How the beneficiary can access the security and any constraints on such access.

- *Option 1 – Restricted Cash:* The beneficiary can access the security by way of drawdown of the Reclamation Holdback account. Access to these funds will be immediate upon drawdown of the account. There are no constraints on such access.
- *Option 2 – Letter of Credit:* The beneficiary can access the security by redeeming and drawing upon the letter of credit facility with the financial institution providing security, if required. There are limited constraints as access to the security, once redeemed, occurs on a short turnaround.

A report prepared by a third party estimating the costs of reclaiming the proposed project. The report must include the estimated salvage value of project components.

Greenlight Project Demolition & Reclamation Estimate – Class 5 estimate completed by WSP Canada Inc. in August 2025 (WSP Canada Inc. 2025). GECGP notes that no net positive salvage of scrap steel costs is considered in this estimate. Valuations of scrap steel are highly volatile and can be expected to fluctuate on a routine basis. As the detailed design has not yet commenced, there is no real actionable information to support development of a salvage cost for the project.

An explanation of why the chosen form of security was selected, having regard to its attributes and priority in bankruptcy, including how the secured party would be able to realize on the reclamation security should the project owner and operator be in default.

The options of chosen security have been selected as they provide the most liquid form of security for any and all reclamation activities that are required by the GECGP.

- A restricted funds account restricts access to these cash flows based upon the terms and conditions of the restrictions. The account cannot be accessed for any other form of payment other than for reclamation purposes until the reclamation is completed as outlined. This form of security is verifiable at any time via confirmation from the financial intuition, as well as confirmed through annual audits of GECGP.
- A letter of credit, which is backed by parental guarantee, provides assurances that in the event of default, the funds will remain accessible to make payments upon any and all reclamation activities, as outlined. This form of security is verifiable as the letter of credit will be held by the AUC upon issuance.

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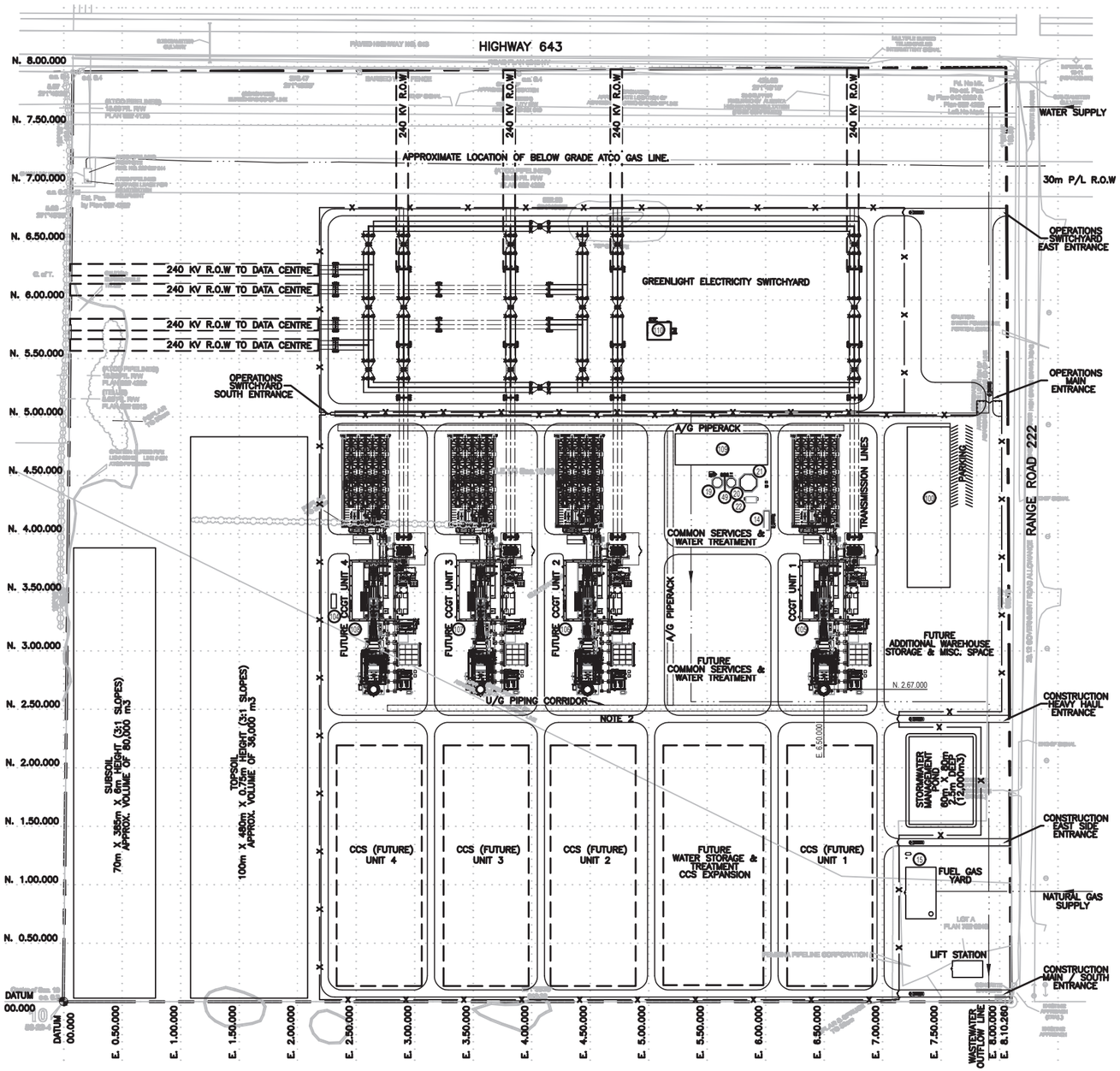
Appendices

Appendix A Plot Plan

SITE NORTH / TRUE NORTH



PLAN
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LEGEND

- LEASE LIMITS
- TRANSMISSION LINES
- UNDERGROUND PIPING
- FUTURE
- CONSTRUCTION PHASES & LAYDOWN
- FENCE LINE
- DATUM

BUILDING LIST

ITEM	TAG	DESCRIPTION
100	-	OPERATION CENTRE
101	-	WAREHOUSE / STORAGE / MAINTENANCE
102	-	
103	-	
104	-	SATELLITE CONTROL BUILDING
105	-	CCGT UNIT 1 BUILDING
106	-	CCGT UNIT 2 BUILDING
107	-	CCGT UNIT 3 BUILDING
108	-	CCGT UNIT 4 BUILDING
109	-	COMMON SERVICES BUILDING
110	-	SWITCHYARD CONTROL HOUSE
111	-	
112	-	
113	-	
114	-	

EQUIPMENT LIST

ITEM	TAG	DESCRIPTION
1	-	HRSG STACK
2	-	HEAT RECOVERY STEAM GENERATOR (HRSG)
3	-	GAS TURBINE
4	-	GENERATOR
5	-	STEAM TURBINE
6	-	AIR COOLED CONDENSER
7	-	FEEDWATER PUMP BUILDING
8	-	CLOSED COOLING WATER FIN FAN COOLERS (1 FUTURE UNIT)
9	-	CLOSED COOLING WATER PUMPS
10	-	GAS TURBINE INLET FILTER
11	-	
12	-	CONTINUOUS EMISSIONS MONITORING ENCLOSURE (CEMS)
13	-	
14	-	AQUEOUS AMMONIA STORAGE/UNLOADING AREA
15	-	FUEL GAS YARD AREA
16	-	
17	-	
18	-	
19	-	WASTEWATER STORAGE TANK
20	-	DEMINERALIZED WATER STORAGE TANK
21	-	RAW WATER STORAGE TANK
22	-	FIRE PUMP HOUSE
23	-	
24	-	
25	-	
26	-	
27	-	
28	-	GENERATOR STEP-UP TRANSFORMER
29	-	
30	-	STATION SERVICE TRANSFORMER
31	-	
32	-	
33	-	FUEL GAS PERFORMANCE FILTER
34	-	STORM WATER MANAGEMENT BASIN
35	-	
36	-	CONDENSATE PUMPS, VACUUM PUMPS, CONDENSATE RECEIVER
37	-	HRSG BLOWDOWN TANK DISCHARGE SUMP
38	-	HRSG BLOWDOWN TANK
39	-	CCWS PUMP SKID
40	-	FUEL GAS HRSG BURNER PIPING SKID
41	-	FINAL FUEL GAS FILTER
42	-	TURBINE BUILDING DRAINS SUMP
43	-	FUEL GAS KNOCKOUT DRUM
44	-	
45	-	
46	-	AMMONIA RECIRC SKID
47	-	HRSG BLOWDOWN HEAT EXCHANGER
48	-	BLOWDOWN FLASH TANK
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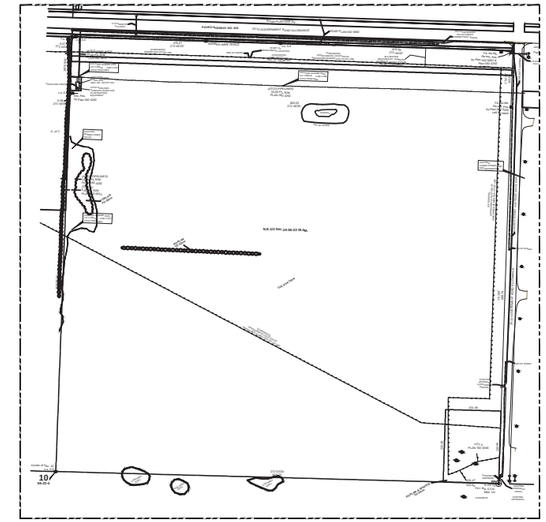

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NOTES

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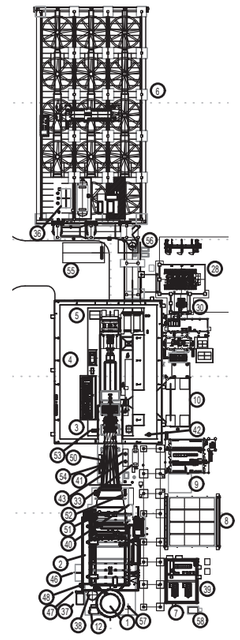
2. ROAD USAGE AND LOCATION TO BE DETERMINED.



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FOR PRELIMINARY INFORMATION ONLY

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REV	DATE	DESCRIPTION	PROJECT No.	BY	CHK	APPD

SEAL:

WSP Canada Inc.

CLIENT: KINETICOR

WSP PROJECT NUMBER:	SURFACE LOCATION:	PROJECT:
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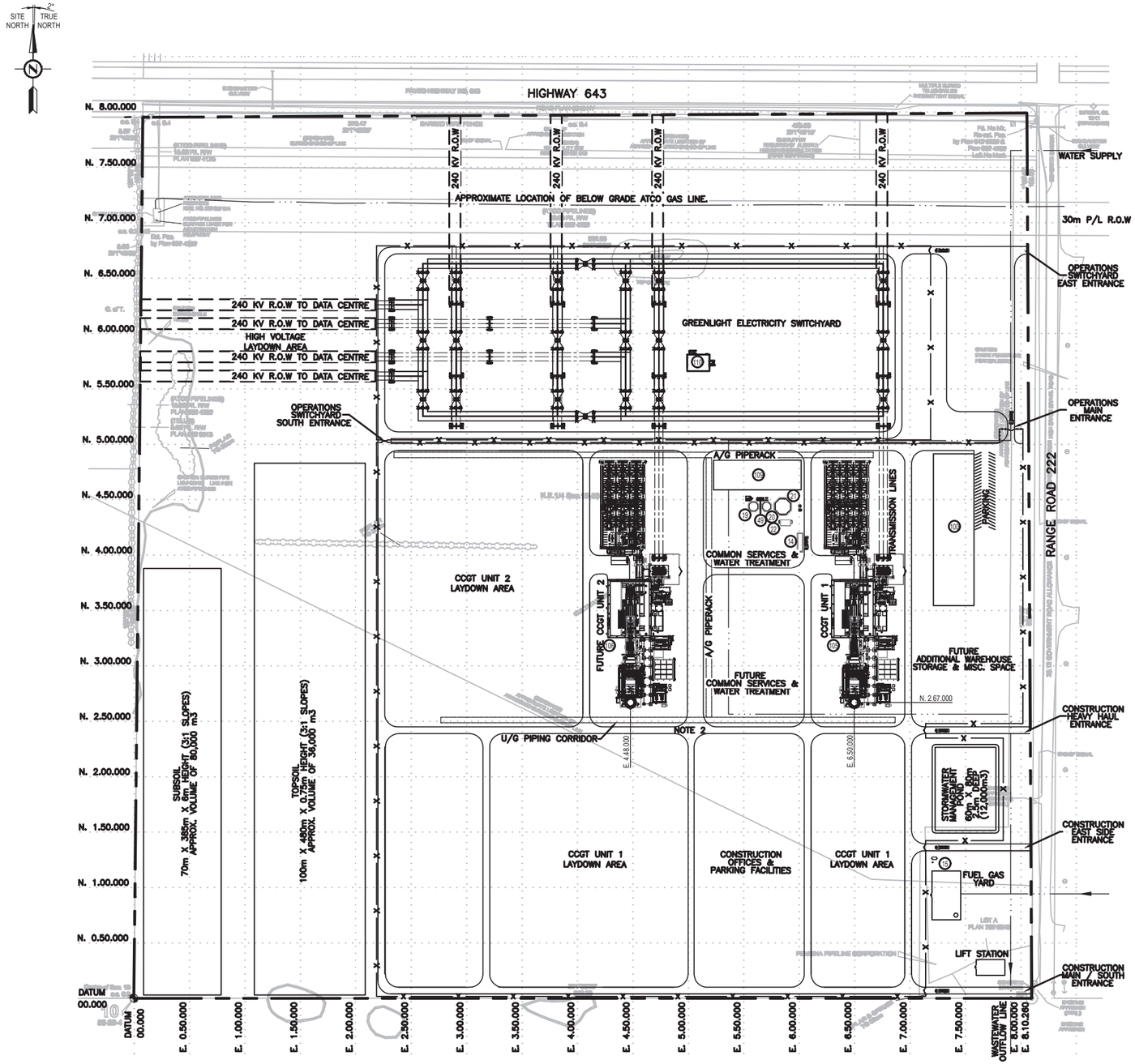

PLAN
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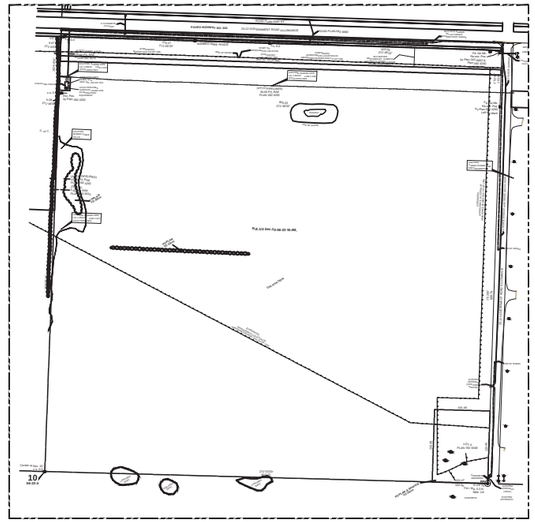

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NOTES

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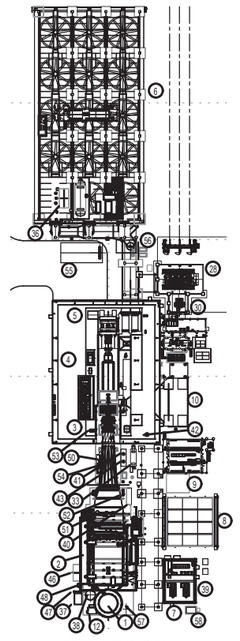

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FOR PRELIMINARY INFORMATION ONLY

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REV	DATE	DESCRIPTION	PROJECT No.	BY	CHK	APPD

SEAL:

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PERMIT STAMP AND PROFESSIONAL STAMP AFFIXED APPLIES ONLY TO THE CURRENT REVISION AS INDICATED BY CLOUDED AREAS IF SHOWN AND OUTSIDE THE VENDOR LIMITS.

WSP Canada Inc.

CLIENT: KINETICOR

WSP PROJECT NUMBER:	SURFACE LOCATION:	PROJECT:
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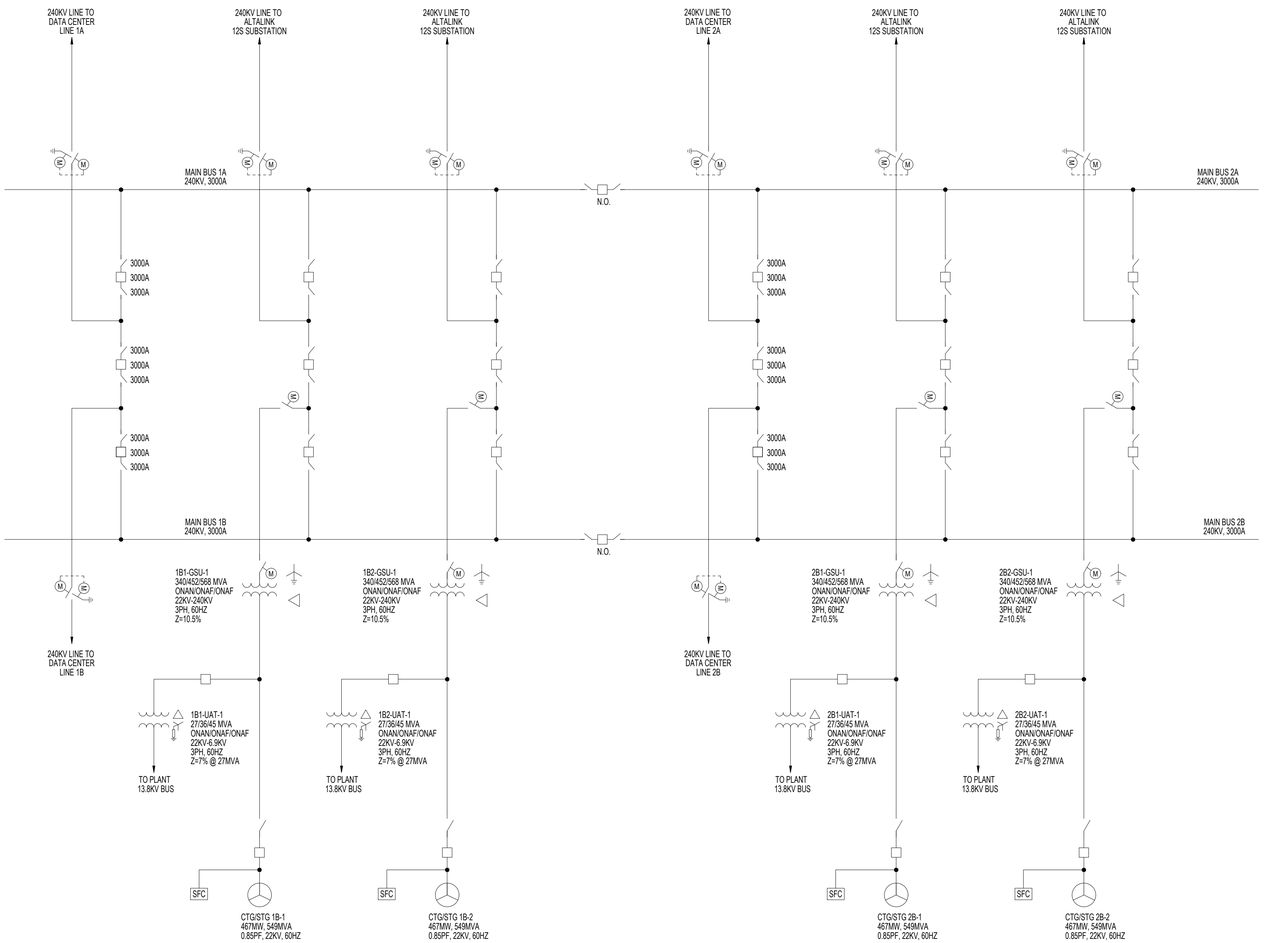
CLIENT PROJECT NUMBER:		TITLE: PLOT PLAN CONSTRUCTION PHASE 1
SCALE: AS SHOWN		
ALTERNATE DRAWING NUMBER: --	SHEET NUMBER: 2 OF 2	DRAWING NUMBER: KAM-GEC001-G100-002A
		REV. A

Appendix B Single Line Diagram



NOTES

1. EQUIPMENT RATINGS AND CONFIGURATION ARE PRELIMINARY AND SUBJECT TO CHANGE.
2. SOME REQUIRED EQUIPMENT HAS BEEN OMITTED FROM THIS DRAWING TO IMPROVE CLARITY.
3. DATA CENTER FEEDS ARE SUBJECT TO CHANGE BASED ON DATA CENTER FACILITY REQUIREMENTS. THE INTENT IS THE DATA CENTER WILL HAVE A 240KV SUBSTATION SUPPLYING AN UNKNOWN NUMBER OF LOAD TRANSFORMERS.
4. EQUIPMENT TAGGING AND NUMBERING IS PRELIMINARY.
5. THE GENERATION FACILITY IS TO BE EVALUATED FOR EMERGENCY POWER REQUIREMENTS AND A BACKUP DIESEL GENERATOR SIZED ACCORDINGLY.
6. SFC – START-UP FREQUENCY CONVERTER.
7. REVENUE METER LOCATIONS ARE TO BE DETERMINED.
8. TURBINE AUXILIARY LOADS REQUIRE 4160V AND 600V SUPPLY.
9. SUBSTATION TO INCLUDE PROVISIONS FOR FUTURE CARBON CAPTURE LOAD.
10. DATA CENTER (1800MW) - NORMAL OPERATION 450MW PER FEEDER (4 FEEDERS IN SERVICE). EACH FEEDER CAN SUPPORT 900MW.
11. FUTURE FEEDERS TO CARBON CAPTURE FACILITY ARE NOT SHOWN. EPC TO EVALUATE AND INCORPORATE PROVISIONS FOR FUTURE FACILITY. SUPPLY MAY BE FROM 240KV SUBSTATION OR 22KV GENERATOR BUS DUCT. ADDITIONAL EVALUATION AND DISCUSSION REQUIRED.

THIS DOCUMENT MUST NOT BE USED FOR CONSTRUCTION
(OR FABRICATION OR INSTALLATION)

REFERENCE DRAWINGS:

REFERENCE DRAWING NUMBER	REFERENCE DRAWING TITLE
--	--

REVISION:

REV	DATE	DESCRIPTION	PROJECT No.	BY	CHK	APPD
--	2025-06-10	--	--	ZK	--	--

SEAL:

DISCLAIMER:

WSP Canada Inc.

CLIENT: KINETICOR

WSP PROJECT NUMBER: --	SURFACE LOCATION: --	PROJECT: GREENLIGHT ELECTRICITY CENTER
CLIENT PROJECT NUMBER: --		TITLE: KEY ONE LINE DIAGRAM SKETCH
SCALE:		
ALTERNATE DRAWING NUMBER: --	SHEET NUMBER: 1 OF 1	DRAWING NUMBER: E01-01 / REV.: E

Appendix C Air Quality Assessment

Greenlight Electricity Centre Project
Air Quality Assessment

August 2025

Prepared for:
Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP.
Calgary, AB

Prepared by:
Stantec Consulting Ltd.
Calgary, AB

Project/File:
123514064

Stantec

Limitations and Sign-off

This document entitled Greenlight Electricity Center Project - Air Quality Assessment was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP. (the “Client”) to support the regulatory review process for its *Environmental Protection and Enhancement Act* (EPEA) Approval (the “Application”) for the Greenlight Electricity Center Project (the “Project”). In connection therewith, this document may be reviewed and used by the Alberta Environment and Protected Areas (AEPA) participating in the review process in the normal course of its duties. Except as set forth in the previous sentence, any reliance on this document by any other party or use of it for any other purpose is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The information and conclusions in the document are based on the conditions existing at the time the document was published and does not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by the Client or others, unless expressly stated otherwise in the document. Any use which another party makes of this document is the responsibility and risk of such party. Such party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other party as a result of decisions made or actions taken based on this document.

Prepared by: Bajwa, Kanwardeep Digitally signed by Bajwa, Kanwardeep Date: 2025.08.22 10:43:32 -06'00'

Signature

Kanwardeep Bajwa, Ph.D.

Printed Name

Quality Reviewer:

PROFESSIONAL ENGINEER ALBERTA REID PERSON APEGA ID 89203 2025 Aug 22

Signature

Reid Person, M.Eng., P.Eng. (AB, BC, SK)

Printed Name

Independent Reviewer: Doupe, Jason Digitally signed by Doupe, Jason Date: 2025.08.22 14:21:49 -06'00'

Signature

Jason Doupe, M.Eng.

Printed Name

Approved by: Mathew, Ashley Digitally signed by Mathew, Ashley Date: 2025.08.22 09:08:22 -06'00'

Signature

Ashley Mathew, P.Eng.

Printed Name

PERMIT TO PRACTICE
STANTEC CONSULTING LTD.
RM SIGNATURE:
RM APEGA ID #: 113862
DATE: August 22 2025
PERMIT NUMBER: P000258
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Executive Summary

Greenlight Electricity Centre GP Ltd. (GECGP or Greenlight) plans to build and operate an 1864 megawatt (MW) combined cycle power facility located in the Alberta Industrial Heartland – Designated Industrial Zone (IH-DIZ), approximately 13 km north of Fort Saskatchewan, Alberta in the NE 10-56-22 W4M and part of SE 10-56-22 W4M. The Greenlight Electricity Centre (the Project) will consist of four Siemens SGT6-8000H gas turbines and four heat recovery steam generators (HRSGs) with steam turbines (466 MW combined per pair of gas and steam turbine generator).

Stantec Consulting Ltd. (Stantec) was contracted by GECGP to conduct air dispersion modelling in support of an application for the EPEA approval. The dispersion modelling was performed in accordance with the current Alberta Environment and Protected Areas (AEPA) Air Quality Model Guideline (AQMG; (AEP 2021a)) and Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022a). The dispersion modelling assessment was conducted with the objective of assessing the effects on ground-level concentrations for key substances of interest resulting from Project emissions compared to the Alberta Environment and Protected Areas (AEPA) Ambient Air Quality Objectives and Guidelines (AAAQO/G; (AEPA 2024a)). The primary substances of interest emitted by the Project are nitrogen oxides (NO_x), carbon monoxide (CO) and fine particulate matter ($PM_{2.5}$). Emissions of sulphur dioxide (SO_2) are considered negligible as the Project combusts sweet natural gas.

The air quality assessment shows that maximum predicted ground-level concentrations for all substances of interest associated with emissions from the Project sources (the Project alone) are below the AAAQO/G for all relevant averaging periods (ranging between 0.1% and 15% of the AAAQO/G).

The maximum predicted NO_2 and CO concentrations for all averaging periods associated with the Base Case (regional emission sources with ambient background) and the Application Case (regional emission sources, project emission sources, and ambient background) are below the AAAQO. The maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations associated with the Base Case and the Application Case are greater than the relevant AAAQO/G. For both the Base Case and the Application Case, the maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations occur approximately 12 km south of the Project boundary near the Chemtrade facilities and 14.4 km south-southwest of the Project boundary near the Bunge Canada oil processing plant, respectively.

Comparison between maximum predicted concentrations for the Base Case and Application Case indicates small increases (up to 2.5%) to the maximum predicted NO_2, CO and $PM_{2.5}$ concentrations with the addition of the Project. The model results show that overall maximum concentrations in the study area, including predicted exceedances of the AAAQO/G for $PM_{2.5}$ for the Base and Application Case, are primarily attributable to emissions from the existing regional industrial facilities.

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Acronyms / Abbreviations

AAAQO/G	Alberta Ambient Air Quality Objectives and Guidelines
AEIR	Annual Emissions Inventory Reporting
AEPA	Alberta Environment and Protected Areas, formerly Alberta Environment and Parks (AEP)
AQMG	Air Quality Model Guideline
ARM2	Ambient Ratio Method Version 2
asl	above sea level
BPIP	Building Profile Input Program
ºC	degrees Celsius
CDEM	Canadian Digital Elevation Model
CO	Carbon Monoxide
ECCC	Environment and Climate Change Canada
EPEA	Environmental Protection and Enhancement Act
FAP	Fort Air Partnership
g/s	grams per second
GECGP	Greenlight Electricity Centre GP Ltd.
Gj	gigajoule
GTG	Siemens SGT6-8000H gas turbine generators
HAMP	Heartland Air Monitoring Partnership
HRSG	heat recovery steam generator
IH-DIZ	Industrial Heartland – Designated Industrial Zone
K	Kelvin (measure of temperature)
kg	kilogram
kg/h	kilogram per hour
km	kilometre
kPa	kilopascal
kW	kilowatt
m	meter
m/s	meters per second
m^3	cubic meter

MW	megawatt
MWh	megawatt hour
NAD	North American Datum
NO	nitric oxide (nitrogen monoxide)
NO_2	nitrogen dioxide
NO_X	nitrogen oxides (oxides of nitrogen)
NPRI	National Pollutant Release Inventory
OLM	Ozone Limiting Method
PVMRM	Plume Volume Molar Ratio Method
PRIME	Plume Rise Model Enhancements
The Project	the Greenlight Electricity Centre
$PM_{2.5}$	fine particulate matter with aerodynamic particle diameter less than 2.5 microns
SCR	Selective Catalytic Reduction
SO_2	sulfur dioxide
Stantec	Stantec Consulting Ltd.
t/d	tonnes per day
TCM	Total Conversion Method
TF/EE	transboundary flows/exceptional events
UTM	Universal Transverse Mercator
U.S. EPA	U.S. Environmental Protection Agency
WRF	Weather research and Forecasting
$\mu g/m^3$	microgram per cubic meter

1 Introduction

Greenlight Electricity Centre GP Ltd. (GECGP or Greenlight), on behalf of Greenlight Electricity Centre LP. plans to build and operate an 1864 megawatt (MW) combined cycle power facility located in Alberta Industrial Heartland – Designated Industrial Zone (IH-DIZ), approximately 13 km north of Fort Saskatchewan, Alberta, in the NE 10-56-22 W4M and part of the SE 10-56-22 W4M. The Greenlight Electricity Centre (the Project) will consist of four Siemens SGT6-8000H gas turbines and four heat recovery steam generators (HRSGs) with steam turbines (466 MW combined per pair of gas and steam turbine generator).

Stantec Consulting Ltd. (Stantec) was contracted by GECGP to conduct air dispersion modelling in support of an application for the *Environment Protection and Enhancement Act* (EPEA) approval. The dispersion modelling was performed in accordance with the current Alberta Environment and Protected Areas (AEPA) Air Quality Model Guideline (AQMG (AEP 2021a)) and Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022a) specific to the IH-DIZ. The dispersion modelling assessment was conducted with the objective of assessing the effects on ground-level concentrations for key substances of interest resulting from Project emissions compared to the Alberta Environment and Protected Areas (AEPA) Ambient Air Quality Objectives and Guidelines (AAAQO/G; (AEPA 2024a)). The primary substances of interest emitted by the Project are nitrogen oxides (NO_x), carbon monoxide (CO) and fine particulate matter ($PM_{2.5}$). Emissions of sulphur dioxide (SO_2) are considered negligible as the Project combusts sweet natural gas.

The main objective of the study was to use plume dispersion modelling to assess potential effects on air quality from Project emissions. The air quality assessment focused on the following tasks:

- Summarizing regional air quality
- Calculating Project emissions and comparing emissions to provincial and federal emission standards
- Characterizing meteorological and surface conditions
- Completing plume dispersion modelling
- Assessing Project effects on ambient air quality in combination with existing nearby industrial sources and regional background concentrations in the study area

2 Regulatory Criteria

2.1 Ambient Air Quality Objectives

Air quality is assessed by comparing measured or predicted concentrations to objectives and standards. AEPA has established AAAQO/G for a number of substances. They are referred to as AAAQO/G (AEPA 2024a).

The Project is a source of NOx, CO and $PM_{2.5}$. Oxides of nitrogen are produced in most combustion processes and are almost entirely made up of nitrogen oxide (NO) and nitrogen dioxide (NO_2). Together they are often referred to as NOx. Nitrogen dioxide is a respiratory irritant, while NO is relatively inert. As such, regulatory ambient air quality objectives exist for NO_2, and not for NO or NOx. Table 2.1 presents the relevant AAAQO/G.

Table 2.1 Alberta Ambient Air Quality Objectives and Guidelines

Key Substance of Interest	Averaging Period	AAAQO/G [a] ($\mu g/m^3$)
NO_2	1-hour	300
	Annual	45
CO	1-hour	15,000
	8-Hour	6,000
$PM_{2.5}$	1-hour	80 [b]
	24-Hour	29

Notes:

Concentrations are in micrograms per cubic metre ($\mu g/m^3$) at 25 Celsius (°C) and 101.325 Kilopascal (kPa).

[a] Alberta Ambient Air Quality Objectives (AEPA (2024a) unless otherwise stated.

[b] Alberta Ambient Air Quality Guideline (AEPA (2024a)

2.2 Interpretation of Predicted Concentrations

AEPA AQMG (AEP 2021a) recognizes that extreme, rare, and transient meteorological conditions can affect predicted 1-hour average ambient air concentrations. To address this issue, AEPA recommends "the highest eight 1-hour predicted average concentrations for each receptor in each single year should be disregarded". Therefore, for the assessment of 1-hour average concentrations, the 9th highest hourly values (equal to the 99.9th percentile) for each year at a given location are used to determine compliance with the 1-hour AAAQO/G.

For averaging periods greater than 1-hour (e.g., annual), no predicted exceedances of the AAAQO/G are viewed as being acceptable. Therefore, the maximum 8-hour, 24-hour, and annual average predicted concentrations are used in the assessment.

Five years of meteorological data is used as input to AERMOD dispersion model. Maximum predicted concentrations are determined for each year of output. The summary tables and figures in Section 6 show the results of the maximum of the five individual years.

3 Regional Setting

3.1 Study Area

The Project will be located approximately 13 km north of Fort Saskatchewan, Alberta, in the IH-DIZ. A 35 km by 35 km study area centered at the Project was selected for the air quality assessment to model the cumulative effects of the Project and other regional industrial facilities within the IH-DIZ. The study area extents area based on the guidance in the Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022a).

Topography within the 35 km 35 km air quality study area is shown in Figure 3.1. With the North Saskatchewan River running from southwest to northeast across the study area, the terrain slopes downhill along the river, and uphill to the northwest and southeast of the study area. The Project is located at a base elevation of 646 m above sea level (asl). Terrain elevations within the study area range from approximately 585 to 730 m asl.

The Canadian Digital Elevation Model (CDEM) data (NRCan 2016), with approximately 30 m spatial resolution, was used to characterize the terrain in the study area and assign terrain elevations to emission sources and receptor points.

3.2 Background Ambient Air Quality

The background ambient air quality is the result of anthropogenic (man-made) and biogenic (natural) air emissions on a local, regional, and global scale. Representative background ambient air quality concentrations were determined based on analysis of regional ambient air quality monitoring data and were added to the model predicted concentrations to account for other emission sources (anthropogenic or biogenic) in and outside the study area that may not have been captured in the air dispersion modelling (e.g., emissions associated with distant oil sands facilities or vehicle emissions on nearby roads).

The Project is located within the Heartland Air Monitoring Partnership (HAMP) airshed (formerly known as Fort Air Partnership (FAP)). 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 NO_2 and $PM_{2.5}$ is the Gibbons station and for 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 (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 background ambient air concentrations for the study area are summarized and compared to the AAAQO in Table 3.1. The background NO_2 concentrations are 10.6% and 21.8% of the 1-hour and annual AAAQO, respectively. The background CO concentrations range between 2.5% and 6.3% of the 1-hour and 8-hour AAAQOs, respectively. The $PM_{2.5}$ concentrations range from 21.5% to 57.7% of the 1-hour and 24-hour AAAQO/G, respectively. These background concentrations were added to the Base Case and Application Case (see Section 5.6) dispersion modelling predictions.

Table 3.1 Ambient Background Concentrations

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

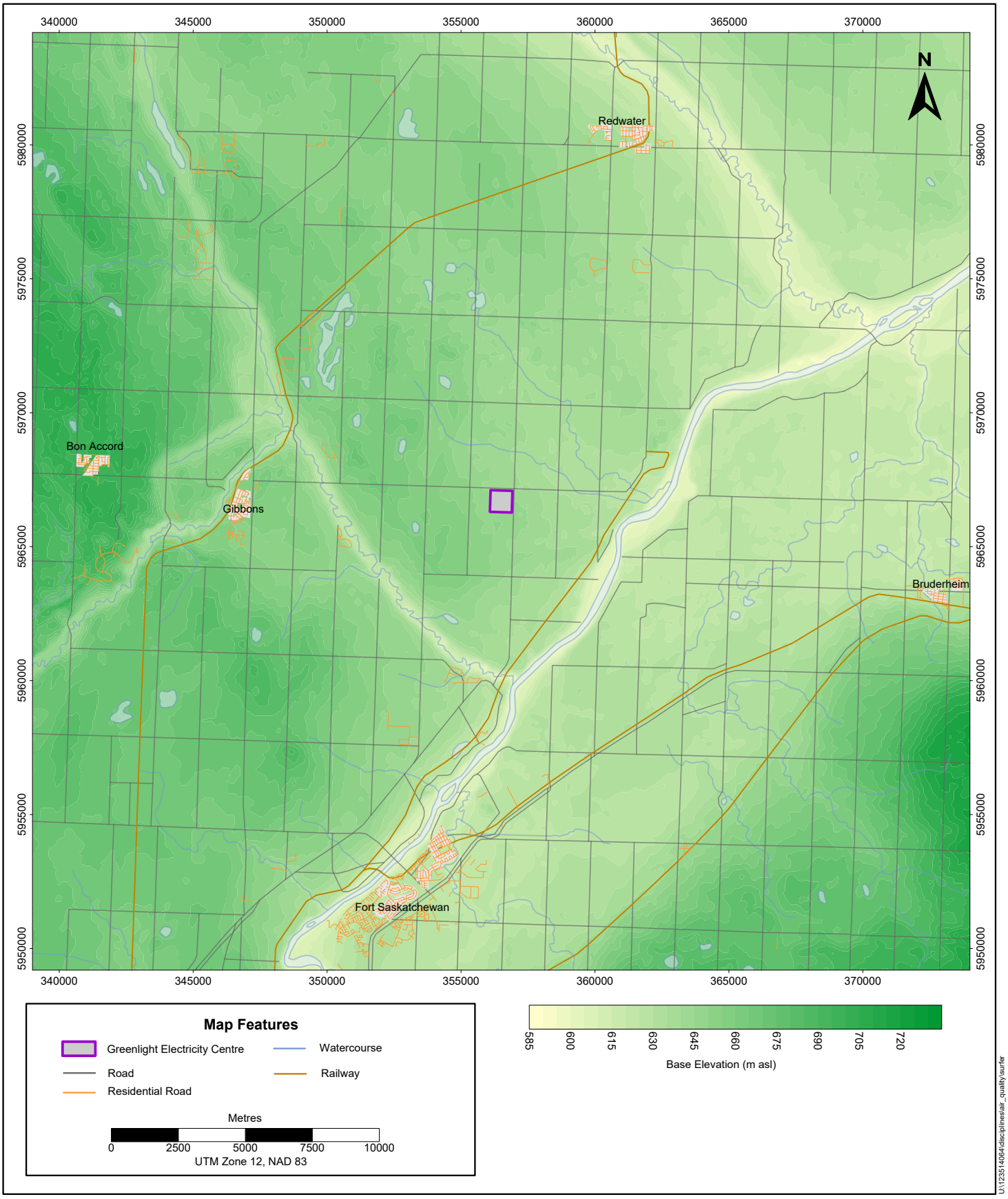
Notes:

[a] 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.

Source: AEPA Data Management Platform (AEPA 2025a).



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Air Quality Assessment for GreenLight Electricity Centre

Terrain Elevations within the 35 km by 35 km Study Area

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
3.1

4 Emissions

4.1 Greenlight Electricity Centre

Proposed emission sources for the Project include four Siemens SGT6-8000H gas turbine generators (GTG) equipped with ultra-low NOx burners and four heat recovery steam generators (HRSG) equipped with natural gas fired low NOx duct burners. The hot exhaust gases from the gas turbines are used to produce steam. The steam is used to generate electricity in four steam turbines. The Project will be equipped with a selective catalytic reduction (SCR) system to reduce NO_X emissions.

Dispersion modelling has been completed based upon the conservative assumption that all turbines operate continuously at the maximum rated capacity for each combined cycle system with all exhaust exiting through the HRSG stacks. The Project equipment burns sweet natural gas and as a result there are no substantive emissions of sulphur dioxide (SO_2).

Emission rates were estimated based on the GTG performance data sheet provided by GECGP (GECGP 2025) including duct firing to achieve increased power generation. The NOx emission rate of 46.6 kg/h (12.9 g/s) is based on an emission intensity of 0.1 kg NOx per MWh (net power output). The CO and $PM_{2.5}$ emission rates are the maximum emission rates from the GTG performance data sheet provided by GECGP (GECGP 2025).

The locations of these sources are shown in Figure 4.1. Table 4.1 provides a summary of stack parameters and emission rates for the Project emission sources.

The NO_X emissions from the Project for new electricity generation facilities are subject to provincial and federal emission limits. Table 4.2 shows provincial and federal emission criteria for new turbines along with emissions from the Project gas turbines plus HRSGs in equivalent units. Project emissions meet federal and provincial emission standards for new electrical generation facilities.

Table 4.1 Stack Parameters and Emissions for the Greenlight Electricity Centre

Source		Siemens SGT6-8000H Gas Turbine (GTG) + HRSG 1	Siemens SGT6-8000H Gas Turbine (GTG)+ HRSG 2	Siemens SGT6-8000H Gas Turbine (GTG)+ HRSG 3	Siemens SGT6-8000H Gas Turbine (GTG)+ HRSG 4
Model ID		HRSG1	HRSG2	HRSG3	HRSG4
Period of Operation		Continuous	Continuous	Continuous	Continuous
Power Rating [a]	kW	466,000	466,000	466,000	466,000
Fuel Type		Sweet Natural Gas	Sweet Natural Gas	Sweet Natural Gas	Sweet Natural Gas
Stack Location [b]					
UTM Easting	m	356,744	356,539	356,446	356,353
UTM Northing	m	5,966,550	5,966,557	5,966,561	5,966,564
Base Elevation [c]	m	646.0	646.8	647.0	647.0
Stack Parameters					
Stack Height	m	60.0	60.0	60.0	60.0
Stack Inside Diameter [d]	m	6.56	6.56	6.56	6.56
Exit Temperature [e]	K	346.6	346.6	346.6	346.6
Exit Velocity [f]	m/s	18.1	18.1	18.1	18.1
Emission Rate					
NO_X	g/s	12.9	12.9	12.9	12.9
CO [g]	g/s	8.2	8.2	8.2	8.2
$PM_{2.5}$ [g]	g/s	4.7	4.7	4.7	4.7

Notes:

[a] Power rating is the combined net electrical power rating per train based upon power output from each Siemens SGT6-8000H gas turbine and the total power generated by the steam turbines. All parameters provided by GECGP.

[b] Based on Project site plot plan provided by GECGP (UTM NAD 83, Zone 12).

[c] Extracted based on the Canadian Digital Elevation Model (CDEM) database (NRCan 2016).

[d] Based on stack drawings provided by GECGP.

[e] Based on stack exit temperature from the GTG performance data sheet provided by GECGP (GECGP 2025).

[f] Calculated based on the stack flow rate from the GTG performance data sheet provided by GECGP (GECGP 2025).

[g] Based on the maximum emission rates from GTG performance data sheet provided by GECGP (GECGP 2025). The total of particulate emission rate (front) and particulate emission rate (front and back half) was assumed to be equal to the $PM_{2.5}$ emission rate (GECGP 2025).

Table 4.2 Comparison of Project NO_X Emissions with Provincial and Federal Emission Limits for New Electricity Generation Facilities

Regulatory Jurisdiction	Substance	Reference	Units	Emission Limits (for each new generating unit)	Equivalent Project Emission Rate (Gas Turbine + HRSG)
Provincial	NO_X	AEP (2005) [a]	kg/MWh	0.3 [b]	0.1 [d]
Federal	NO_X	Environment and Climate Change Canada (ECCC 2017)	g/GJ	85 [c]	27.8 [d]

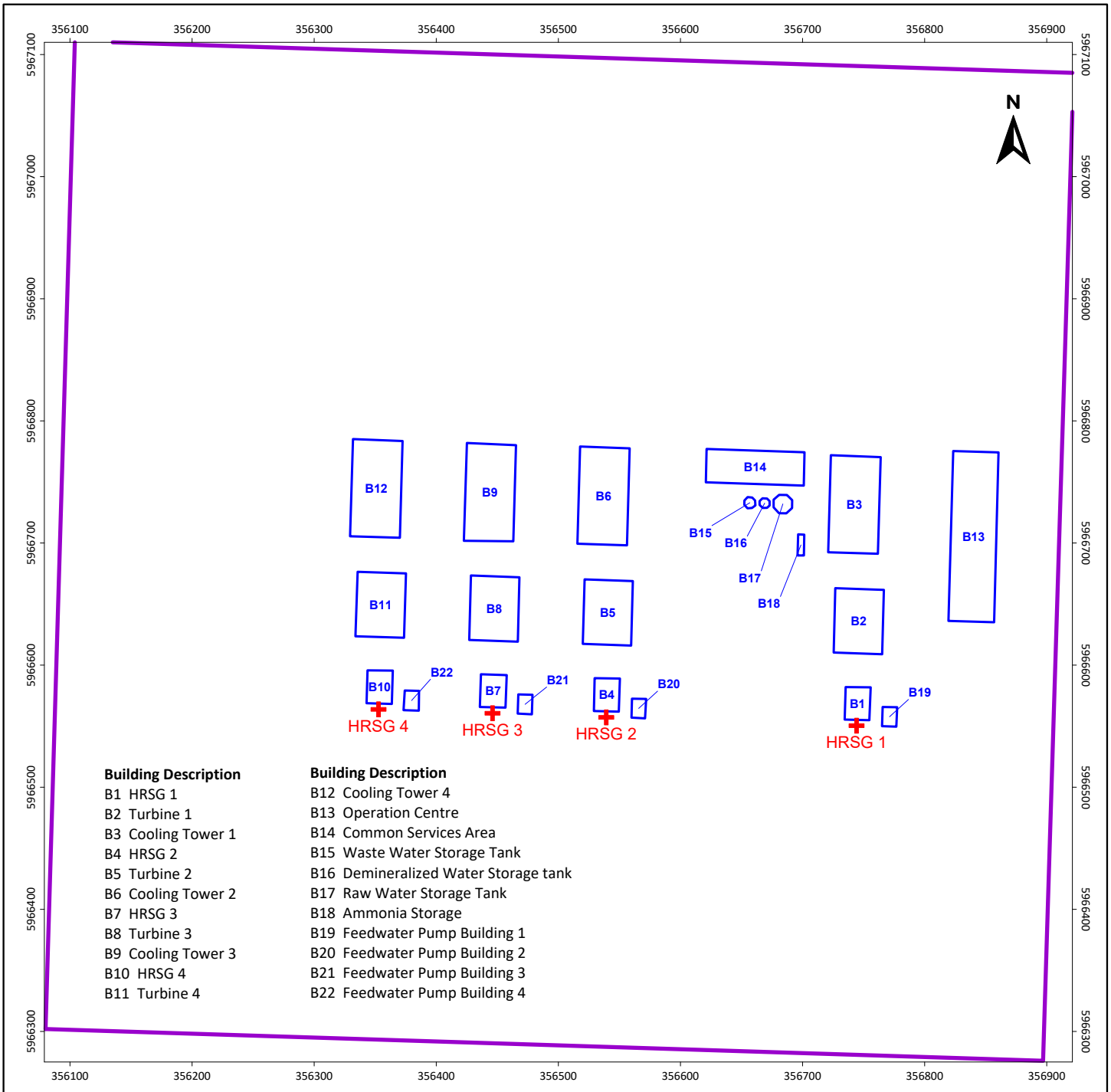
Notes:

[a] AEP emission standard applies to net power or heat output.

[b] Emission standards for new natural gas fired generating units greater than 60 MW.

[c] Federal emission limits for non-peaking turbines greater than 70 MW capacity per GJ of power output.

[d] Calculated based upon combined net electrical power output from the gas and steam turbine generators.



Building Description

B1 HRSG 1
B2 Turbine 1
B3 Cooling Tower 1
B4 HRSG 2
B5 Turbine 2
B6 Cooling Tower 2
B7 HRSG 3
B8 Turbine 3
B9 Cooling Tower 3
B10 HRSG 4
B11 Turbine 4

Building Description

B12 Cooling Tower 4
B13 Operation Centre
B14 Common Services Area
B15 Waste Water Storage Tank
B16 Demineralized Water Storage tank
B17 Raw Water Storage Tank
B18 Ammonia Storage
B19 Feedwater Pump Building 1
B20 Feedwater Pump Building 2
B21 Feedwater Pump Building 3
B22 Feedwater Pump Building 4

Map Features

Project Boundary
Buildings
Stacks

Metres
0 100 200 300

UTM Zone 12, NAD 83

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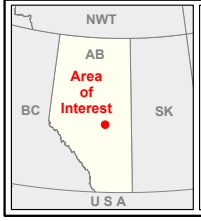


Air Quality Assessment for GreenLight Electricity Centre

Simplified Project Plot Plan

PREPARED BY
Stantec

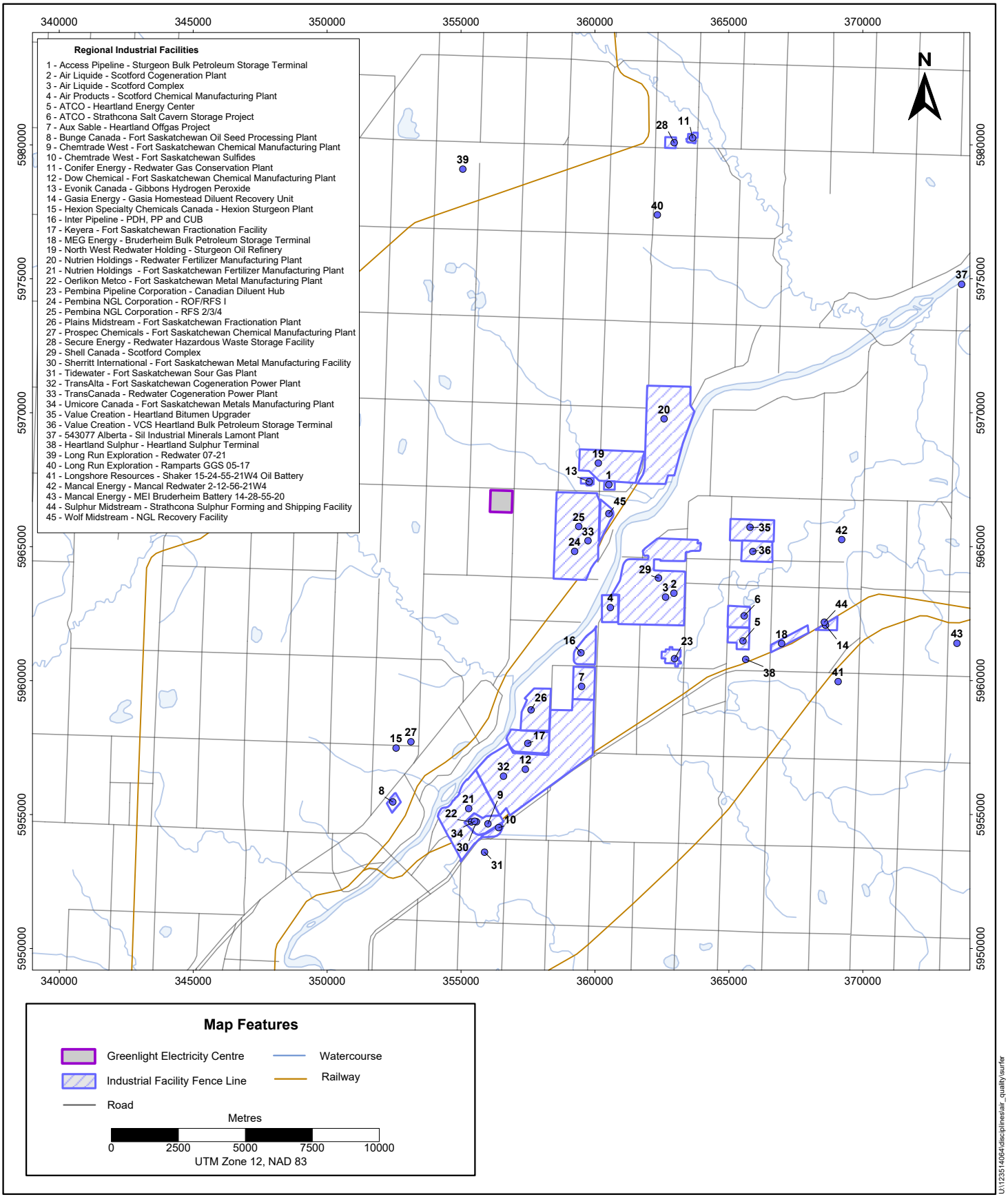
PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
4.1

4.2 Regional Emissions

As recommended by the AQMG (AEP 2021a), nearby industrial emission sources in the study area have been included in dispersion modelling. Based on a search of the most recent Alberta Annual Emissions Inventory Reporting (AEIR) (AEPA 2024b), the Environment and Climate Change Canada (ECCC) National Pollutant Release Inventory (NPRI) database (ECCC 2024), and provincial EPEA Approvals (AEPA 2025b), it was determined that there are 45 existing and approved major sources of emissions located in the 35 km by 35 km study area. Emissions from these facilities are included in the dispersion modelling. The facility names and facility total emissions are summarized in Table 4.3. The stack, area source, and volume source location, parameters, and emission rates of each regional emission source are presented in Appendix A.

Figure 4.2 shows the locations of the neighbouring facilities in the study area relative to the Project. Table 4.3 summarizes total emissions associated with the regional emission sources within the study area.



Air Quality Assessment for GreenLight Electricity Centre

Regional Facilities within the Study Area

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
4.2

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Table 4.3 Emissions from Regional Facilities within Study Area Emissions

No.	Operator	Facility	NO_X (t/d)	CO (t/d)	$PM_{2.5}$ (t/d)
1	Access Pipeline Inc.	Sturgeon Bulk Petroleum Storage Terminal	0.000	0.000	0.000
2	Air Liquide Canada Inc.	Scotford Cogeneration Plant	1.572	0.378	0.020
3	Air Liquide Canada Inc.	Air Liquide Scotford Complex	1.763	0.257	0.016
4	Air Products Canada Ltd.	Scotford Chemical (Hydrogen) Manufacturing Plant	0.709	0.496	0.054
5	ATCO Energy Solutions Ltd.	Heartland Energy Center	0.664	0.947	0.223
6	ATCO Energy Solutions Ltd.	Strathcona Salt Cavern Storage Project and Brine Storage Pond	0.000	0.001	0.000
7	Aux Sable Canada Ltd.	Heartland Off-gas Project	0.177	0.149	0.012
8	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	0.077	0.095	0.356
9	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	0.000	0.000	0.023
10	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	0.015	0.019	0.000
11	Conifer Energy Inc.	Redwater Gas Conservation Plant	0.122	0.604	0.012
12	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	8.068	2.345	0.295
13	Evonik Canada Inc	Gibbons Hydrogen Peroxide	0.058	0.049	0.008
14	Gasia Energy Partners Ltd.	Gasia Homestead Diluent Recovery Unit	0.066	0	0.011
15	Hexion Specialty Chemicals Canada Inc.	Hexion Sturgeon Plant	0.230	0.195	0.038
16a	Inter Pipeline Propylene Ltd.	Propane Dehydrogenation (PDH)	0.191	0.021	0.016
16b	Inter Pipeline Propylene Ltd.	Polypropylene (PP)	0.267	0.129	0.025
16c	Inter Pipeline Propylene Ltd.	Cogeneration Power Plant	1.107	0.396	0.003
17	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility and Brine Storage Ponds	1.327	3.091	0.092
18	MEG Energy Corp.	Bruderheim Bulk Petroleum Storage Terminal and Diluent Removal Facility	0.080	0.134	0.013
19	North West Redwater Holding Corp	Sturgeon Oil Refinery	2.945	2.333	0.005
20	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	9.228	14.2	0.606

No.	Operator	Facility	NO_X (t/d)	CO (t/d)	$PM_{2.5}$ (t/d)
21	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	2.674	1.221	0.411
22	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	0.002	0.002	0.041
23	Pembina Marketing Ltd.	Canadian Diluent Hub Bulk Petroleum Storage Terminal	0.035	0.177	0.056
24	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility (ROF)	0.663	0.841	0.233
25	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	0.867	0.908	0.065
26	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant and Associated Brine Storage	0.813	0.550	0.070
27	Prospec Chemicals	Fort Saskatchewan Xanthate and Xanthate Derivatives Chemical Manufacturing Plant	0.012	0.123	0.000
28	Secure Energy Services Inc.	Redwater Hazardous Waste and Recyclables Storage and Processing Facility	0.062	0.123	0.008
29a	Shell Chemicals Canada	Scotford Chemicals Facility	1.560	0.973	0.042
29b	Shell Canada Products	Scotford Refinery	4.244	3.800	0.078
29c	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	10.109	3.359	0.011
30	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	8.363	0.887	0.059
31	Tidewater Midstream and Infrastructure Ltd.	Fort Saskatchewan Sour Gas Plant	0.007	0.001	0.002
32	TransAlta Generation Partnership	Fort Saskatchewan Cogeneration Power Plant	1.872	0.203	0.070
33	TransCanada Energy Ltd.	Redwater Cogeneration Power Plant	0.823	0.340	0.027
34	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	0.018	0.015	0.108
35	Value Creation Inc.	Heartland Bitumen Upgrader	0.801	4.804	0.162
36	Value Creation Inc.	VCS Heartland Bulk Petroleum Storage Terminal	0.000	0.001	0.000
37	543077 Alberta Ltd	Sil Industrial Minerals Lamont Plant	0.036	0.012	0.000
38	Heartland Sulphur Ltd.	Heartland Sulphur Terminal	0.021	0.017	0.000
39	Long Run Exploration Ltd.	Redwater 07-21	0.029	0.044	0.000

No.	Operator	Facility	NO_X (t/d)	CO (t/d)	$PM_{2.5}$ (t/d)
40	Long Run Exploration Ltd.	Ramparts GGS 05-17	0.144	0.223	0.001
41	Longshore Resources Ltd	Shaker 15-24-55-21W4 Oil Battery	0.015	0.031	0.004
42	Mancal Energy Inc	Mancal Redwater 2-12-56-21W4	0.004	0.008	0.001
43	Mancal Energy Inc	MEI Bruderheim Battery 14-28-55-20	0.001	0.004	0.001
44	Sulphur Midstream Ltd.	Strathcona Sulphur Forming and Shipping Facility	0.018	0.015	0.000
45	Wolf Midstream	NGL Recovery Facility	0.004	0.006	0.001
Total			**61.86**	**44.50**	**3.28**

5 Modelling Methodology

The effects of the Project emissions on ambient air quality are evaluated using a numerical atmospheric dispersion model. Dispersion models simulate transport, dispersion, transformation, and deposition processes in the atmosphere. Dispersion models are used to predict ambient air quality changes for a wide range of meteorological conditions and account for local terrain influences. Because of the many uncertainties associated with the application of dispersion models, the model results can be viewed as "best estimates" relative to the decision-making process when standardized model approaches are adopted (U.S. EPA 2005).

The AERMOD model is used to assess air quality changes due to the Project emissions. This air quality assessment is undertaken in accordance with the AQMG (AEP 2021a).

5.1 Meteorology

Meteorology influences how the air emissions from industrial and natural sources disperse into the atmosphere and thus have a direct effect on ambient air quality. The atmospheric dispersion of emissions is governed by the amount of turbulence that exists in the mixed layer of air in contact with the ground. The turbulence levels are dependent on thermal effects (e.g., vertical temperature stratification) and mechanical effects caused by topography, surface roughness, and wind speed. The height of the mixing layer determines the vertical extent to which emissions can diffuse.

Meteorological data for the AERMOD dispersion model was prepared using the latest version (Version 24142) of the AERMET meteorological model (U.S. EPA 2024a) using the 5-year Weather Research and Forecasting Model (WRF) 4 km resolution meteorological dataset (2015-2019) provided by AEPA for dispersion model assessments (AEP 2022b). Surface and upper air data for AERMET input was extracted from the WRF dataset for the Project location using the AEPA Multi-Model Extraction Utility 2 (MMEU2) (AEP 2021b). The AERMET model was used to process the meteorological dataset and estimate friction velocity and Monin-Obukhov length – two parameters that characterize the amount of turbulence in the atmosphere based on provided input for the land cover within 3 km of the Project. Modern planetary boundary layer theory is used by AERMET to scale turbulence and other parameters to the height of the plume. The AERMET model derives hourly mixing heights based on the upper air and surface meteorology, which are used in the AERMOD dispersion model.

The details of the use of the AERMET model and results are provided in Appendix B. AERMET model input options were specified following the AQMG (AEP 2021a). The wind rose derived for the Project location based on the extracted 2015-2019 AERMET data indicates that winds occur most often from the west, southwest northwest directions. Winds occur least frequently from the northeast.

The meteorological data that is used to evaluate air quality changes associated with Project emissions account for the seasonal and diurnal variations over a five-year period, and for the amount of turbulence in the atmosphere. The five-year period includes cool, normal, and warm years. The data are viewed as being representative of the wide range of meteorological conditions that could occur in the region.

5.2 AERMOD Model

AERMOD is a steady-state plume dispersion model which can simulate the effects of hourly varying meteorological conditions on air emission transport, dispersion, transformation, and deposition. The model is designed to estimate near-field (less than 50 km) ground-level concentrations considering terrain influences. The concentration distribution in the plume is assumed to be Gaussian in both horizontal and vertical directions. AERMOD contains algorithms for near-source effects such as building downwash, transitional plume rise, and partial plume penetration.

AERMOD requires hourly meteorological data processed with the AERMET meteorological pre-processor including parameters that characterize the amount of turbulence in the atmosphere (friction velocity and Monin-Obukhov length). AERMOD produces hourly average pollutant concentrations that can be further processed to obtain predictions for other averaging periods. Input terrain elevations at receptor locations for the AERMOD model are assigned by a Stantec in house tool to extract terrain elevations.

The AERMOD dispersion model (U.S. EPA 2024b) is accepted by AEPA for refined air quality assessments. This assessment is undertaken in accordance with the AQMG (AEP 2021a) and Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022a) specific to IH-DIZ. At the time that the modelling was completed, Version 24142 was the most recent version of the AERMOD model available from the United States Environmental Protection Agency (U.S. EPA). As required in the AQMG (AEP 2021a), this version of the model was used in the assessment.

5.3 NO_X to NO_2 Conversion

NO_X includes NO and NO_2. Most of the NO_X emissions are in the form of NO which is converted in the atmosphere to NO_2 due to reactions with ambient O_3. Air quality regulators have selected NO_2 to assess and manage ambient levels of NO_X for several reasons: much of the information on the distribution in air, human exposure and dose, and associated health effects for NO_X is available for only NO_2, and emissions and concentrations of NO_2 are highly correlated with those of other oxides of nitrogen which allow management of NOx emissions via a focus on NO_2. Consequently, only NO_2 concentrations are regulated by the AAAQO/G.

The AQMG (AEP 2021a) specifies several recommended methods for estimating the fraction of NO_2 concentrations in the plume for the purpose of comparison to the AAAQO/G. The recommended methods must be implemented in a tiered approach, where the first screening tier of the assessment is to conservatively assume that 100% of the NO_X concentrations are converted to NO_2 (i.e., Total Conversion Method (TCM)). If the AAAQO/G are met using this conservative assumption, no other conversion method needs to be implemented. If the results do not meet the AAAQO/G, another recommended method, such as the Ambient Ratio Method Version 2 (ARM2), Ozone Limiting Method (OLM), or Plume Volume Molar Ratio Method (PVMRM) may be applied.

In this assessment, the TCM method NO_2 concentrations from Project emissions met the AAAQO/G. The ARM2 method was also implemented to more realistically estimate NO_2 concentrations. The AQMG (AEP 2021a) recommended default maximum equilibrium ratio of 0.9 and the minimum ratio of 0.2 (equivalent to an assumed NO_2/NO_X in-stack ratio of 0.2) was used for all point sources that were considered in this assessment (Project and non-Project sources).

5.4 Receptor Grids and Terrain

Calculations of ground-level air concentrations were made for locations outside the Project boundary according to the AQMG (AEP 2021a). A series of nested Cartesian grids with increasing receptor density with proximity to the Project were applied. In total, 6,129 receptors were generated for this assessment. As shown in Figure 5.1, the receptor grids and their corresponding spacing are as follows:

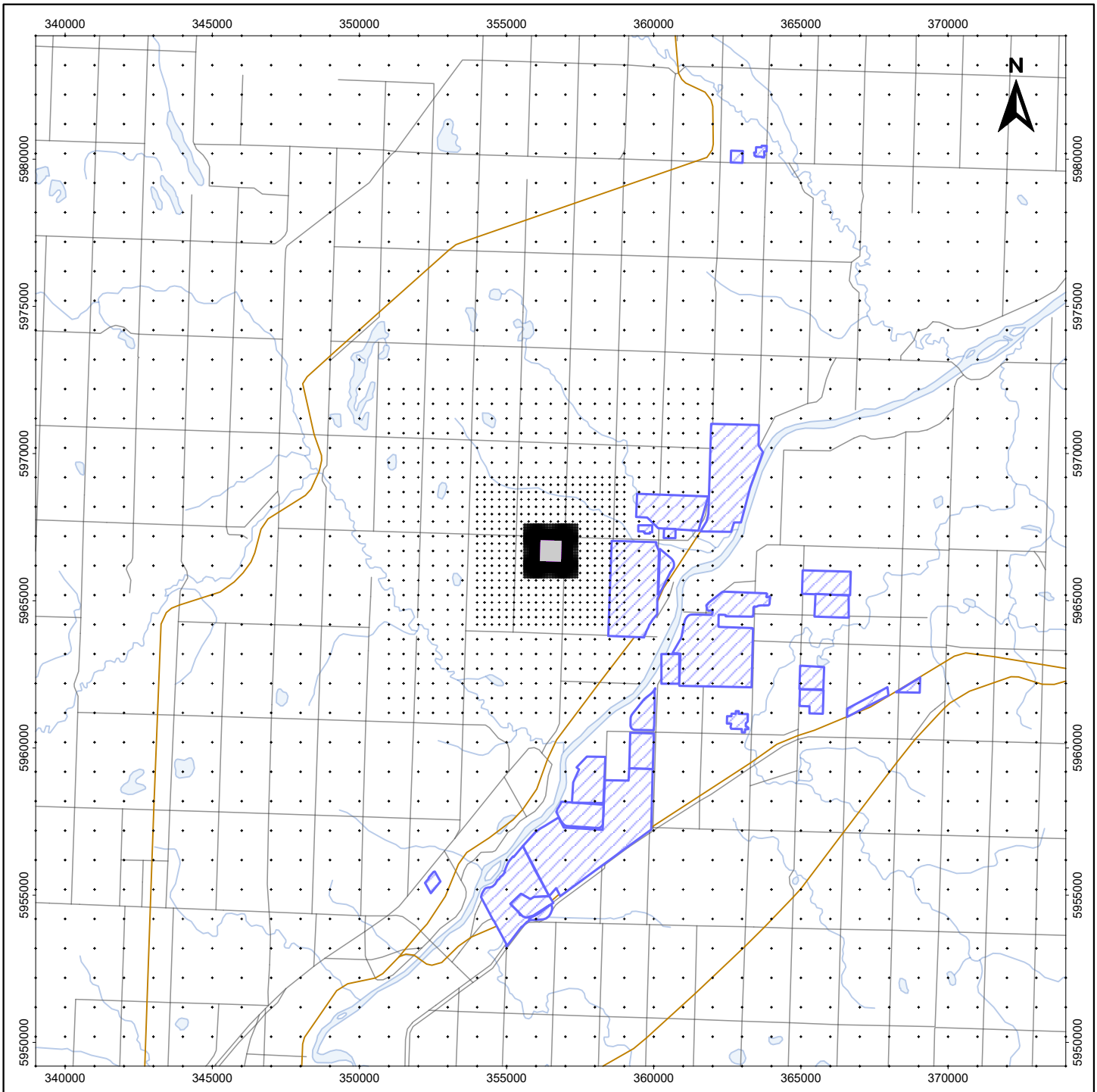
- 20 m spacing along the Project fenceline
- 20 m spacing within 200 m of the Project fenceline
- 50 m spacing within the 500 m of the Project fenceline
- 250 m spacing within the 2 km of the Project fenceline
- 500 m spacing within the 5 km of the Project fenceline
- 1000 m spacing beyond the 5 km of the Project fenceline

Actual terrain elevations were applied to all receptors used in dispersion modelling based on Canadian Digital Elevation Model (CDEM; (NRCan 2016)) terrain elevation data.

5.5 Building Downwash Effects

Buildings or other solid structures may affect the flow of air in the vicinity of a source and cause building downwash effects (e.g., eddies on the downwind side), which have the potential to reduce plume rise and affect dispersion. For dispersion modelling purposes, building downwash effects were considered using the Plume Rise Model Enhancements (PRIME) downwash routine (Schulman et al. 1998) in the Building Profile Input Program (BPIP) (U.S. EPA 1995).

The BPIP is pre-processor program was used to provide the building downwash inputs for the AERMOD model based on the locations of the emission sources and site buildings or structures. For dispersion modelling purposes, building downwash effects were considered for Project sources. Information for the buildings or structure heights is provided in Table 5.1 and building locations are shown in Figure 4.1.



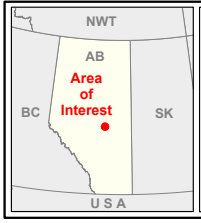
Map Features

- Greenlight Electricity Centre
- Industrial Facility Fence Line
- Road
- Watercourse
- Railway
- Receptor

Metres

0 2500 5000 7500 10000

UTM Zone 12, NAD 83



Air Quality Assessment for GreenLight Electricity Centre

Receptors Applied in the Dispersion Modelling

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
5.1

U:\123514064\disciplines\air_quality\surfer

Table 5.1 Buildings or Structures Considered in the Dispersion Modelling

Buildings or Structure Name	Height (m)
HRSG Building 1	11
Turbine Building 1	28.1
Cooling Tower 1	22.3
HRSG Building 2	11
Turbine Building 2	28.1
Cooling Tower 2	22.3
HRSG Building 3	11
Turbine Building 3	28.1
Cooling Building Tower 3	22.3
HRSG Building 4	11
Turbine Building 4	28.1
Cooling Tower 4	22.3
Operation Centre	10.3
Common Services Area	10.3
Waste Water Storage Tank	5
Demineralized Water Storage tank	5
Raw Water Storage Tank	5
Ammonia Storage	6.9
Feedwater Pump Building 1	3
Feedwater Pump Building 2	3
Feedwater Pump Building 3	3
Feedwater Pump Building 4	3

5.6 Modelling Scenarios

To assess the effects on air quality associated with emissions from the Project, dispersion modelling was conducted for the following scenarios:

- Base Case: includes emissions associated with existing regional facilities in the study area (excluding the Project) and ambient background
- Project Case: includes emissions from the Greenlight Electricity Center
- Application Case: includes cumulative emissions from the Project, existing regional facilities and ambient background

Table 5.2 summarizes total emissions associated with the Project and the regional emission sources. The Project will contribute 6.7%, 6.0%, and 33.2% of the total NO_X, CO, and $PM_{2.5}$ emissions within the study area. Project $PM_{2.5}$ emissions are conservative as they are based upon manufacturer performance data referenced to standard stack test methods (method 5-202 and/or 201A-202) which overstates condensable particulate emissions.

Table 5.2 Total Emissions within the Study Area

Modelling Scenario	**NO_X (t/d)**	**CO (t/d)**	**$PM_{2.5}$ (t/d)**
Base Case (Regional Sources)	61.9	44.5	3.28
Project Case	4.47	2.82	1.63
Application Case (Base Case + Project Case)	66.3	47.3	4.91
Contribution of Project to Application Case (%)	6.7%	6.0%	33.2%

6 Dispersion Modelling Results

The air dispersion modelling assessment considered three scenarios: Base Case, Project Case and Application Case. Contour plots of the maximum predicted concentrations for all modelling cases are provided in Appendix C. The NO_2 (Total Conversion Method (TCM)) values shown in Table 6.1 to Table 6.3 are equivalent to NO_2 assuming 100% conversion of NOx to NO_2. The assessment focuses on predicted NO_2 concentrations associated with the more realistic ARM2 approach rather than TCM.

6.1 Base Case

Dispersion modelling for the Base Case includes emissions from the regional industrial facilities. The maximum predicted concentrations, including background, are summarized in Table 6.1.

Table 6.1 Maximum Predicted Ground-level Concentrations (µg/m^3) Associated with the Base Case

Substance	Averaging Period	Maximum Predicted Ground-Level Concentrations (µg/m^3)	Ambient Background Concentration (µg/m^3)	Maximum Predicted Concentration Including Background (µg/m^3)	AAAQO/G (µg/m^3)	Comparison of Predictions to AAAQO/G
NO_2 (TCM) [a]	1-hour [b]	450	31.9	NA	NA	161%
	Annual	22.1	9.8	NA	NA	71%
NO_2 (ARM2) [c]	1-hour [b]	146	31.9	178	300	59%
	Annual	18.4	9.8	28.2	45	63%
CO	1-hour [b]	1,418	380	1,798	15,000	12%
	8-hour	1,101	379	1,480	6,000	25%
$PM_{2.5}$	1-hour [b]	124	17.2	**142**	80	177%
	24-hour	53.6	16.7	**70.3**	29	242%

Notes:

[a] 100% of the NO_X concentrations are converted to NO_2 (Total Conversion Method (TCM)).

[b] 9th highest predictions (AEP 2021a).

[c] NO_X was converted to NO_2 using the ARM2.

Bold text indicates exceedance of the AAAQO/G.

NA – Not Applicable (TCM NO_2 concentrations not compared against the AAAQO as ARM2 values used for comparison to AAAQO)

6.1.1 NO_2 Predictions

The maximum predicted 1-hour and annual average ground-level NO_2 concentrations associated with the Base Case are 178 µg/m^3 and 28.2 µg/m^3, respectively, including background. All maximum predicted NO_2 concentrations are less than the relevant AAAQO. The maximum predicted 1-hour and annual NO_2 concentrations occur 6.5 km east-northeast of Project boundary adjacent to the Shell Scotford Complex and 9.5 km south-southeast of Project boundary adjacent to Dow Chemical facility, respectively, as shown in Appendix C, Figures C.1 and C.2.

6.1.2 CO Predictions

The maximum predicted 1-hour, and 8-hour average ground-level CO concentrations associated with the Base Case are 1,798 µg/m^3 and 1,480 µg/m^3, respectively, including background. All maximum predicted CO concentrations are less than the relevant AAAQO. The maximum predicted 1-hour and 8-hour CO concentrations occur 4.8 km east-northeast of the Project boundary adjacent to the North West Sturgeon refinery and 5.1 km east of the Project boundary adjacent to Nutrien Redwater fertilizer facility, respectively, as shown in Appendix C, Figures C.3 and C.4.

6.1.3 $PM_{2.5}$ Predictions

The maximum predicted 1-hour and 24-hour average ground-level $PM_{2.5}$ concentrations associated with the Base Case are 142 µg/m^3 and 70.3 µg/m^3, respectively, including background. All maximum predicted $PM_{2.5}$ concentrations are greater than the relevant AAAQO/G. The maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations occur approximately 12 km south of the Project boundary near the Chemtrade facilities and 14.4 km south-southwest of the Project boundary near the Bunge Canada oil processing plant, respectively, as shown in Appendix C, Figures C.5 and C.6.

6.2 Project Case

Dispersion modelling for the Project Case includes emissions from the four GTG plus the HRSGs. All combustion equipment is assumed to operate continuously at maximum rated capacity with all exhaust exiting through the HRSG stacks. The maximum predicted concentrations, without background, are summarized in Table 6.2.

Table 6.2 Maximum Predicted Ground-level Concentrations (µg/m³) Associated with the Project Case

Substance	Averaging Period	Maximum Predicted Ground-Level Concentrations (µg/m³)	AAAQO/G (µg/m³)	Comparison of Predictions to AAAQO/G
NO_2 (TCM) [a]	1-hour [b]	29.2	NA	NA
	Annual	0.840	NA	NA
NO_2 (ARM2) [c]	1-hour [b]	26.3	300	9%
	Annual	0.757	45	2%
CO	1-hour [b]	18.4	15,000	0.1%
	8-hour	16.0	6,000	0.3%
$PM_{2.5}$	1-hour [b]	10.6	80	13%
	24-hour	4.46	29	15%

Notes:

[a] 100% of the NO_X concentrations are converted to NO_2 (Total Conversion Method (TCM)).

[b] 9th highest predictions (AEP 2021a).

[c] NO_X was converted to NO_2 using the ARM2.

NA – Not Applicable (TCM NO_2 concentrations not compared against the AAAQO as ARM2 values used for comparison to AAAQO)

6.2.1 NO_2 Predictions

The maximum predicted 1-hour and annual average ground-level NO_2 concentrations associated with the Project Case are 26.3 µg/m³ and 0.757 µg/m³, respectively, without background. All maximum predicted NO_2 concentrations are less than 10% of the relevant AAAQO. The maximum predicted 1-hour and annual NO_2 concentrations occur approximately 450 m east of the Project boundary, as shown in Appendix C, Figures C.7 and C.8.

6.2.2 CO Predictions

The maximum predicted 1-hour, and 8-hour average ground-level CO concentrations associated with the Project Case are 18.4 µg/m³ and 16.0 µg/m³, respectively, without background. All maximum predicted CO concentrations are less than 1% of the relevant AAAQO. The maximum predicted 1-hour, and 8-hour CO concentrations occur approximately 450 m and 400 m east of the Project boundary, respectively, as shown in Appendix C, Figures C.9 and C.10.

6.2.3 $PM_{2.5}$ Predictions

The maximum predicted 1-hour and 24-hour average ground-level $PM_{2.5}$ concentrations associated with the Project Case are 10.6 µg/m^3 and 4.46 µg/m^3, respectively, without background. All maximum predicted $PM_{2.5}$ concentrations are less than or equal to 15% of the relevant AAAQO/G. The maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations occur approximately 450 m and 500 m east of the Project boundary, respectively, as shown in Appendix C, Figures C.11 and C.12.

6.3 Application Case

Dispersion modelling for the Application Case includes emissions from the Project and the regional emission facilities. The maximum predicted concentrations, including background, are summarized in Table 6.3.

6.3.1 NO_2 Predictions

The maximum predicted 1-hour and annual average ground-level NO_2 concentrations associated with the Application Case are 183 µg/m^3 and 28.3 µg/m^3, respectively, including background. All maximum predicted NO_2 concentrations are less than the relevant AAAQO/G. The 1-hour and annual NO_2 concentrations increased by 2.5% and 0.3%, respectively, compared to the Base case predicted concentrations.

The maximum predicted 1-hour NO_2 concentrations occur 10 km east-northeast of Project boundary, east of the Nutrien Redwater fertilizer plant. The maximum predicted annual NO_2 concentrations occur 9.5 km south-southeast of Project boundary adjacent to Dow Chemical facility, respectively, as shown in Appendix C, Figures C.13 and C.14.

6.3.2 CO Predictions

The maximum predicted 1-hour, and 8-hour average ground-level CO concentrations associated with the Application Case are 1,798 µg/m^3 and 1,481 µg/m^3, respectively, including background. All maximum predicted CO concentrations are less than the relevant AAAQO/G. The 1-hour and annual CO concentrations increased by less than or equal to 0.05% compared to the Base Case predicted concentrations.

The maximum predicted 1-hour and 8-hour CO concentrations occur 4.8 km east-northeast of the Project boundary adjacent to the North West Sturgeon refinery and 5.1 km east of the Project boundary adjacent to Nutrien Redwater fertilizer facility, respectively, as shown in Appendix C, Figures C.15 and C.16.

6.3.3 $PM_{2.5}$ Predictions

The maximum predicted 1-hour and 24-hour average ground-level $PM_{2.5}$ concentrations associated with the Application Case are 142 µg/m^3 and 70.3 µg/m^3, respectively, including background. Maximum predicted $PM_{2.5}$ concentrations are greater than the relevant AAAQO/G. The 1-hour and 24-hour $PM_{2.5}$ concentrations increased by less or equal to 0.0003% relative to the Base Case predicted concentrations.

The maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations occur approximately 12 km south of the Project boundary near the Chemtrade facilities and 14.4 km south-southwest of the Project boundary near the Bunge Canada oil processing plant, respectively, as shown in Appendix C, Figures C.17 and C.18.

Table 6.3 Maximum Predicted Ground-level Concentrations (µg/m^3) Associated with the Application Case

Substance	Averaging Period	Maximum Predicted Ground-Level Concentrations (µg/m^3)	Ambient Background Concentration (µg/m^3)	Maximum Predicted Concentration Including Background (µg/m3)	AAAQO/G (µg/m^3)	Comparison of Predictions to AAAQO/G	% Change between Base Case and Application Case
NO_2 (TCM) [a]	1-hour [b]	452	31.9	484	NA	NA	0.4%
	Annual	22.2	9.8	32.0	NA	NA	0.2%
NO_2 (ARM2) [c]	1-hour [b]	151	31.9	183	300	61%	2.5%
	Annual	18.5	9.8	28.3	45	63%	0.3%
CO	1-hour [b]	1,418	380	1,798	15,000	12%	0.005%
	8-hour	1,102	379	1,481	6,000	25%	0.05%
$PM_{2.5}$	1-hour [b]	124	17.2	**142**	80	177%	0.0%
	24-hour	53.6	16.7	**70.3**	29	242%	0.0003%

Notes:

[a] 100% of the NO_X concentrations are converted to NO_2 (Total Conversion Method (TCM)).

[b] 9th highest predictions (AEP 2021a).

[c] NO_X was converted to NO_2 using the ARM2.

Bold text indicates exceedance of AAAQO/G.

NA – Not Applicable (TCM NO_2 concentrations not compared against the AAAQO as ARM2 values used for comparison to AAAQO)

7 Summary and Conclusions

Greenlight Electricity Centre GP Ltd. (GECGP or Greenlight), on behalf of Greenlight Electricity Centre LP. plans to build and operate a 1864 megawatt (MW) combined cycle power facility located in the Alberta Industrial Heartland – Designated Industrial Zone (IH-DIZ), approximately 13 km north of Fort Saskatchewan, Alberta in the NE 10-56-22 W4M and part of the SE 10-56-22 W4M. Potential effects on ambient air quality associated with the Project were evaluated using the AERMOD dispersion model. Maximum ground-level concentrations of NO_2, CO and $PM_{2.5}$ were predicted and compared to the AAAQO/G.

The air quality assessment shows that maximum predicted ground-level concentrations for all substances of interest associated with emissions from the Project (the Project alone) are below the AAAQO/G for all relevant averaging periods (ranging between 0.1% and 15% of the AAAQO/G).

The maximum predicted NO_2 and CO concentrations for all averaging periods associated with the Base Case and the Application Case are below the AAAQO. The maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations associated with the Base Case and the Application Case are greater than the relevant AAAQO/G. For both the Base Case and the Application Case, the maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations occur approximately 12 km south of the Project boundary near the Chemtrade facilities and 14.4 km south-southwest of the Project boundary near the Bunge Canada oil processing plant, respectively.

Comparison between maximum predicted concentrations for the Base Case and Application Case indicates small increases (up to 2.5%) to the maximum predicted NO_2, CO and $PM_{2.5}$ concentrations with the addition of the Project. The model results show that overall maximum concentrations in the study area, including predicted exceedances of the AAAQO/G for $PM_{2.5}$ for the Base and Application Case, are primarily attributable to emissions from the existing regional industrial facilities.

8 References

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Appendices

Appendix A Regional Sources and Emission Parameters

Table A.1 Regional Point Sources and Emission Parameters

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S1	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	440 ESAegeneration Gas Heater (H-62) Exhaust Stack	357553	5959132	622	9.1	0.39	3.50	621	5.40E-02	8.59E-03	1.94E-04	No	No
S2	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	120 kW Fire Water Tank Heater (H-70620) Exhaust Stack	357379	5958490	626	9.1	0.34	15.00	689	5.00E-03	4.11E-03	1.25E-04	No	No
S3	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	COSRP Incinerator (H-902) Stack	357334	5958559	626	27.4	0.60	12.00	886	1.10E-01	5.14E-01	9.72E-02	No	No
S4	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	Merox Incinerator (H-8700) Stack	357613	5959130	623	9.1	0.50	5.00	923	5.88E-02	1.76E-02	3.99E-04	No	No
S5	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	Emergency Flare Stack (M-401)	357288	5958516	625	19.8	1.09	99.90	723	5.67E-02	2.43E-01	8.12E-02	No	No
S6	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	12.5 MW Debutanizer 1 Hot Oil Heater (H-30) Exhaust Stack	357635	5959095	624	26.6	1.40	8.30	674	1.55E+00	4.71E-01	8.42E-03	No	No
S7	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	Emergency Flare Stack (H-2)	357735	5959218	624	80.0	0.76	157.60	1173	5.44E-02	2.80E-01	9.72E-02	No	No
S8	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	Emergency Flare Stack (H-3)	357685	5959184	623	19.8	0.61	99.90	708	2.13E-01	1.16E+00	4.07E-01	No	No
S9	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	484 kW Regeneration Heater (H-62A) Exhaust Stack	357544	5959130	622	6.4	0.41	3.50	623	7.36E-02	8.18E-02	3.31E-03	No	No
S10	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	42.82 MW Depropanizer Hot Oil Heater (H-7002) Exhaust Stack	357749	5959058	625	47.7	1.80	12.10	532	6.78E-01	7.53E-01	3.05E-02	No	No
S11	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	26.67 MW Debutanizer 2 Hot Oil Heater (H-7004) Exhaust Stack	357504	5959105	622	31.9	1.30	15.40	541	4.22E-01	4.69E-01	1.90E-02	No	No
S12	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	16.11 MW Debutanizer 2 Hot Oil Heater (H-60) Exhaust Stack	357534	5959104	623	28.2	1.80	6.40	666	2.00E+00	5.77E-01	1.30E-02	No	No
S13	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	23.45 MW Depropanizer Hot Oil Heater (H-1) Exhaust Stack	357735	5959059	625	44.7	2.10	6.60	648	2.90E+00	9.47E-01	2.14E-02	No	No
S14	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	2.7 MW Natural Gas Heater (H-650) Exhaust Stack	357514	5958527	627	13.3	0.79	5.50	663	3.36E-01	2.05E-02	1.59E-04	No	No
S15	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	1.6 MW Feed Pre-Heater (H-8710) Exhaust Stack	357601	5959113	623	7.8	0.50	3.40	553	1.98E-01	2.45E-02	5.55E-04	No	No
S16	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	4.25 MW Glycol Heater (H-901) Exhaust Stack	357370	5958558	626	18.0	1.20	4.00	553	4.07E-01	4.52E-01	1.83E-02	No	No
S17	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	5.82 MW Glycol Heater (H-801) Exhaust Stack	357361	5958559	626	17.3	1.20	1.50	653	2.97E-01	3.30E-01	1.34E-02	No	No
S18	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant	160 kW Fire Water Tank Heater (H-150) Exhaust Stack	357372	5958495	626	7.9	0.34	35.00	689	6.94E-03	5.71E-03	1.74E-04	No	No
S19	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	1,175 kW De-ethanizer Regeneration Gas Heater (H-3044) Exhaust Stack	357295	5957695	629	11.9	0.76	6.00	442	5.19E-01	4.36E-01	9.87E-03	No	No
S20	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	32,800 kW Hot Oil Furnace (HR-15.02) Exhaust Stack	357330	5957707	630	42.9	2.10	6.60	498	6.81E-01	1.19E+01	2.69E-01	No	No
S21	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	29,472 kW Hot Oil Medium Heater (HR-4155) Exhaust Stack	357235	5957689	629	38.4	2.10	7.62	515	1.18E+00	1.09E+01	2.48E-01	No	No
S22	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	Emergency Flare Stack (FS-3147)	357182	5957726	629	70.5	0.61	20.00	1273	1.40E-01	7.60E-01	2.66E-01	No	No
S23	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	South Flare Pond	357393	5957874	629	22.5	0.74	10.13	837	0.00E+00	0.00E+00	0.00E+00	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S24	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	Pond 4 Flare Pond	357906	5957454	629	22.5	0.74	10.13	837	0.00E+00	0.00E+00	0.00E+00	No	No
S25	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	21,101 kW De-ethanizer Heat Medium Heater (H-3150) Exhaust Stack	357315	5957709	629	43.1	1.85	15.00	421	5.50E-01	7.83E+00	1.77E-01	No	No
S26	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	1,172 kW Glycol Reboiler (BO-10.01) Exhaust Stack	357307	5957646	630	7.0	0.41	2.40	439	3.89E-01	3.26E-01	7.38E-03	No	No
S27	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	746 kW Gas Turbine (PM-18.03) Exhaust Stack	357358	5957570	630	6.7	0.91	43.30	593	2.61E+00	6.68E-01	1.55E-02	No	No
S28	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	746 kW Gas Turbine (PM-18.05) Exhaust Stack	357365	5957570	630	6.7	0.91	43.30	593	2.61E+00	6.68E-01	1.55E-02	No	No
S29	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	820 kW Gas Turbine (PM-18.04) Exhaust Stack	357361	5957570	630	6.7	0.91	43.30	593	2.87E+00	7.35E-01	1.70E-02	No	No
S30	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	820 kW Gas Turbine (PM-18.14) Exhaust Stack	357369	5957570	630	6.7	0.91	43.30	593	2.87E+00	7.35E-01	1.70E-02	No	No
S31	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	1,139 kW Regeneration Gas Heater (HR-15.01) Exhaust Stack	357317	5957694	630	6.6	0.76	35.30	603	5.01E-01	4.21E-01	9.52E-03	No	No
S32	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility	917 kW Regeneration Gas Heater (HR-4111) Exhaust Stack	357254	5957688	629	13.1	0.61	1.95	603	4.05E-01	3.40E-01	7.70E-03	No	No
S51	TransCanada Energy Ltd.	Redwater 40 MW Cogeneration Power Plant	General Electric LM6000-PD DLE Gas Turbine and Heat Recovery Unit Common Exhaust Stack	359737	5965222	637	30.0	3.00	24.10	446	9.53E+00	3.94E+00	3.13E-01	No	No
S52	Conifer Energy Inc.	Redwater Gas Conservation Plant	828 kW Amine Reboiler (E-405) Exhaust Stack	363588	5980359	615	9.1	0.60	2.42	573	8.28E-02	5.61E-02	1.27E-03	No	No
S53	Conifer Energy Inc.	Redwater Gas Conservation Plant	551 kW Inlet Compressor (K-800) Engine Exhaust Stack	363622	5980352	615	10.0	0.25	31.40	422	4.08E-01	3.08E+00	8.37E-03	No	No
S54	Conifer Energy Inc.	Redwater Gas Conservation Plant	Truck Tank Vapour Incinerator Stack	363448	5980106	618	6.6	0.79	6.80	889	6.75E-02	9.65E-02	1.35E-03	No	No
S55	Conifer Energy Inc.	Redwater Gas Conservation Plant	Process Flare Stack	363683	5980384	614	30.5	0.31	0.10	1273	5.67E-02	3.08E-01	1.08E-01	No	No
S56	Conifer Energy Inc.	Redwater Gas Conservation Plant	100 kW Glycol Regen Reboiler (H-650) Exhaust Stack	363630	5980383	615	9.1	0.31	1.12	573	1.00E-02	1.50E-02	1.50E-04	No	No
S57	Conifer Energy Inc.	Redwater Gas Conservation Plant	2,344 kW #1 Field Gate Treater (V-105) Exhaust Stack	363638	5980331	616	8.7	0.60	6.77	753	9.39E-02	1.31E-01	2.97E-03	No	No
S58	Conifer Energy Inc.	Redwater Gas Conservation Plant	2,344 kW #1 Field Gate Treater (V-110) Exhaust Stack	363629	5980331	616	8.7	0.60	6.77	753	9.39E-02	1.31E-01	2.97E-03	No	No
S59	Conifer Energy Inc.	Redwater Gas Conservation Plant	150 kW Refrig Reboiler (H-633) Exhaust Stack	363630	5980381	615	9.1	0.31	1.68	573	1.50E-02	8.37E-03	1.65E-04	No	No
S60	Conifer Energy Inc.	Redwater Gas Conservation Plant	293 kW SRU Waste Gas Oil Heater (B-901) Exhaust Stack	363563	5980392	615	13.1	0.31	3.12	573	2.90E-02	1.64E-02	3.85E-04	No	No
S61	Conifer Energy Inc.	Redwater Gas Conservation Plant	SRU Incinerator (B-920) Stack	363558	5980397	615	35.1	0.36	31.60	1300	1.04E-01	4.02E-02	1.03E-03	No	No
S62	Conifer Energy Inc.	Redwater Gas Conservation Plant	551 kW Inlet Compressor (K-700) Engine Exhaust Stack	363622	5980352	615	10.0	0.25	31.40	422	4.08E-01	3.08E+00	8.37E-03	No	No
S63	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Waste Gas Incinerator Stack	356377	5954515	624	64.0	1.13	3.38	598	3.77E-02	3.18E-02	9.21E-05	No	No
S64	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Flare Stack	356372	5954520	624	67.0	1.10	3.38	598	1.84E-02	8.32E-02	1.07E-04	No	No
S65	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Methane Propane Heater #1 Stack	356431	5954513	624	1.1	0.15	5.00	385	1.69E-03	1.44E-03	4.22E-05	No	Yes
S66	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Methane Propane Heater #2 Stack	356431	5954511	624	1.1	0.15	5.00	385	1.69E-03	1.44E-03	4.22E-05	No	Yes

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S67	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Sulphur Vapourizer Stack	356411	5954494	624	4.6	0.30	5.00	986	4.81E-03	4.09E-03	1.20E-04	No	No
S68	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Hot Oil Heater Stack #1	356394	5954517	624	4.1	0.30	5.00	473	5.00E-02	4.25E-02	1.25E-03	No	No
S69	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Methane Vaporizer #1 Stack	356396	5954517	624	4.1	0.30	5.00	473	2.37E-03	2.01E-03	5.91E-05	No	No
S70	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Methane Vaporizer #2 Stack	356417	5954512	624	4.1	0.30	5.00	473	2.37E-03	2.01E-03	5.91E-05	No	No
S71	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Hot Oil Heater Stack #2	356396	5954515	624	4.1	0.30	5.00	473	5.00E-02	4.25E-02	1.25E-03	No	No
S72	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Vent Condenser Stack	355462	5954710	622	11.9	0.20	5.61	293	0.00E+00	0.00E+00	0.00E+00	No	No
S73	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Wash Bay, North Screener & Blender Baghouse Vent	355426	5954742	622	2.6	0.70	22.00	300	0.00E+00	0.00E+00	5.36E-03	No	Yes
S74	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Reduction Furnace Vent Stack HE-04	355405	5954717	622	9.1	0.30	20.60	388	0.00E+00	0.00E+00	1.62E-03	No	No
S75	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Reduction Furnace Vent Stack HE-06	355408	5954726	622	6.8	0.30	15.30	388	0.00E+00	0.00E+00	3.59E-03	No	Yes
S76	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	HVEM Plant and AIMS Dust Baghouse Stack	355298	5954625	622	3.1	0.51	17.60	293	0.00E+00	0.00E+00	4.25E-01	No	Yes
S77	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	High Value Electronic Vent Stack	355367	5954594	622	10.9	0.16	2.24	300	0.00E+00	0.00E+00	0.00E+00	No	No
S78	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Leach Autoclave Vent	355418	5954711	622	6.8	0.07	2.20	379	0.00E+00	0.00E+00	0.00E+00	No	No
S79	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	PCS Storage Tank Vent	355424	5954686	622	4.6	0.10	2.10	333	0.00E+00	0.00E+00	0.00E+00	No	No
S80	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Screening Baghouse Vent	355404	5954725	622	5.7	0.63	14.19	305	0.00E+00	0.00E+00	5.36E-03	No	Yes
S81	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Nickel Area Baghouse Vents	355394	5954928	620	5.6	0.70	21.40	298	0.00E+00	0.00E+00	1.07E-02	No	Yes
S82	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Packaging and PTA Baghouse Vent	355357	5954811	621	3.8	0.80	25.40	300	0.00E+00	0.00E+00	1.07E-02	No	Yes
S83	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Aluminum and Furnace Baghouse Vent	355408	5954687	622	2.2	0.51	23.60	300	0.00E+00	0.00E+00	5.36E-03	No	No
S84	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	NiCrAl Bent Blending Baghouse Vent	355388	5954726	622	5.0	0.16	2.13	440	0.00E+00	0.00E+00	0.00E+00	No	No
S85	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Primary Reformer Stack	355214	5955284	617	36.6	3.40	15.96	422	2.78E+01	9.28E+00	2.10E-01	No	No
S86	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	CO2 Collection Vent	355298	5955258	618	49.0	0.41	75.00	285	0.00E+00	0.00E+00	0.00E+00	No	No
S87	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Degasifier Vent Stack	355300	5955244	618	36.0	0.10	0.50	292	0.00E+00	0.00E+00	0.00E+00	Yes	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S88	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Selexol Vent Separator Stack	355316	5955249	618	10.7	0.76	4.10	273	0.00E+00	0.00E+00	0.00E+00	Yes	No
S89	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Main Urea Stack	355265	5955115	618	67.1	2.70	23.00	320	3.56E-01	2.97E-01	4.50E+00	No	No
S90	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Utilities Boiler Stack	355218	5955195	618	30.2	1.50	7.10	476	2.03E+00	1.36E+00	3.08E-02	No	No
S91	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Lime Silo Baghouse Exhaust Stack	355321	5955169	619	15.3	0.10	7.40	283	0.00E+00	0.00E+00	0.00E+00	No	No
S92	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Ammonia Loadout Heater Exhaust Stack	355384	5955299	618	4.5	0.46	16.40	366	3.00E-01	2.53E-01	5.72E-03	No	No
S93	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Urea Loadout Dust Scrubber Exhaust Stack	355347	5955022	619	9.1	0.41	18.30	283	0.00E+00	0.00E+00	0.00E+00	No	No
S94	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Synthesis Start Up Heater Stack	355320	5955293	618	11.0	1.30	3.80	630	4.81E-01	4.06E-01	9.14E-03	No	No
S95	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Ammonia Storage Tank Flare Stack	355218	5955012	618	13.7	1.20	7.40	727	1.89E-03	1.62E-03	3.58E-05	No	No
S96	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Carbon Dioxide Stripper Vent	355298	5955258	618	49.0	0.76	6.70	286	0.00E+00	0.00E+00	0.00E+00	Yes	No
S97	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Selexol Dehydrator Vent	355317	5955249	618	13.7	0.15	0.50	337	0.00E+00	0.00E+00	0.00E+00	Yes	No
S98	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Excess Carbon Dioxide Stack	355262	5955265	618	8.0	0.67	2.70	275	0.00E+00	0.00E+00	0.00E+00	No	No
S99	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Purge Gas Vent Stack	355237	5955231	618	5.0	0.30	28.50	305	0.00E+00	0.00E+00	0.00E+00	No	No
S100	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Front End Vent Stack	355205	5955232	617	50.0	1.68	23.60	611	0.00E+00	2.54E+00	0.00E+00	No	No
S101	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Back End Vent Stack	355286	5955244	618	55.0	0.90	33.30	320	0.00E+00	0.00E+00	0.00E+00	No	No
S102	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Granulation - East Train Process Unit - Reactor-Granulator Tail Gas Scrubber Stack	362384	5968260	627	30.5	1.52	14.00	349	0.00E+00	0.00E+00	1.60E-01	No	No
S103	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Sulphuric Acid I Process Unit - Tail Gas Stack	362561	5968281	626	76.2	2.29	13.20	343	0.00E+00	0.00E+00	6.67E-01	No	No
S104	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia I Process Unit - Primary Reformer Exhaust North Cell Stack	362484	5967999	626	29.0	1.47	20.00	464	2.08E+01	2.13E+00	4.81E-02	No	No
S105	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia I Process Unit - Primary Reformer Exhaust South Cell Stack	362484	5967994	626	29.0	1.47	20.00	464	2.08E+01	2.13E+00	4.81E-02	No	No
S106	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia I Carbon Dioxide Stripper Stack	362443	5968003	626	45.0	0.60	21.50	430	0.00E+00	0.00E+00	0.00E+00	No	No
S107	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia I Wet Vent Header Exhaust Stack	362429	5968004	626	45.0	0.15	0.26	328	0.00E+00	1.20E+02	0.00E+00	No	No
S108	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia I Dry Vent Header Exhaust Stack	362426	5968005	626	45.0	0.91	0.10	328	0.00E+00	0.00E+00	0.00E+00	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S109	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia I Converter Start-up Heater Exhaust Stack	362419	5968025	626	26.2	0.98	1.10	1200	1.37E-01	1.15E-01	2.61E-03	No	No
S110	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia II Process Unit - Primary Reformer Exhaust Stack	362441	5967781	625	25.9	3.65	15.00	713	2.78E+01	9.25E+00	2.11E-01	No	No
S111	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia II Carbon Dioxide Stripper Stack (Upper & Lower Vent)	362442	5967896	626	85.0	0.61	23.10	473	0.00E+00	0.00E+00	0.00E+00	No	No
S112	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Granulation - East Train Process Unit - Dryer-Cooler Scrubber Stack	362394	5968256	627	35.1	2.74	15.00	322	1.42E+00	6.22E-01	4.57E-01	No	No
S113	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia II Wet Vent Header Exhaust Stack	362440	5967896	626	85.0	1.58	0.20	328	0.00E+00	2.01E+01	0.00E+00	No	No
S114	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia II Dry Vent Header Exhaust Stack	362446	5967922	626	63.7	0.91	0.11	328	0.00E+00	0.00E+00	0.00E+00	No	No
S115	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonia II Converter Start-up Heater Exhaust Stack	362477	5967948	626	36.6	1.68	0.90	1225	3.44E-01	2.90E-01	6.56E-03	No	No
S116	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonium Nitrate Process Unit - "Brinks" Prill Tower Filter Scrubber Stack	362374	5968034	626	42.7	1.52	34.30	311	0.00E+00	0.00E+00	2.10E+00	No	No
S117	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonium Nitrate Process Unit - Process Scrubber Vent	362369	5968044	626	42.7	1.37	19.70	331	0.00E+00	0.00E+00	5.91E-01	No	No
S118	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Ammonium Nitrate Prill Tower Fans Vent	362380	5968044	626	36.1	1.83	17.00	304	0.00E+00	0.00E+00	7.89E-01	No	No
S119	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Nitric Acid Process Unit - Tail Gas Stack	362329	5967991	626	45.4	1.22	24.90	442	1.81E+01	5.31E-01	1.20E-02	No	No
S120	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Urea Process Unit - Synthesis Unit Process Vent	362324	5967865	625	55.0	0.25	20.30	325	0.00E+00	0.00E+00	0.00E+00	No	No
S121	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Urea Process Unit - Granulation Unit Scrubber Stack	362339	5967824	625	54.9	3.51	12.80	316	0.00E+00	0.00E+00	3.53E-01	No	No
S122	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Urea Process Unit - Synthesis D-410 Relief Drum Vent	362324	5967864	625	55.0	0.91	0.10	442	0.00E+00	0.00E+00	0.00E+00	No	No
S123	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Granulation - East Train Process Unit - Dust Collection Baghouse Type Filter Exhaust Stack	362374	5968268	627	30.5	1.02	10.30	345	0.00E+00	0.00E+00	7.50E-02	No	No
S124	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Utilities Ammonia Flare Stack	362706	5967896	619	15.2	0.30	10.00	450	3.15E-01	2.64E-01	5.99E-03	No	No
S125	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Utilities Boiler # 1 Exhaust Stack	362531	5968035	625	19.5	1.20	1.60	454	3.21E+00	1.11E+00	3.67E-02	No	No
S126	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Utilities Boiler # 2 Exhaust Stack	362543	5968034	625	19.5	1.75	14.13	397	1.27E+00	2.69E+00	6.37E-02	No	No
S127	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Utilities Boiler # 3 Exhaust Stack	362557	5968035	625	18.2	1.50	1.60	400	6.18E+00	2.59E+00	7.07E-02	No	No
S128	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	HRSG Stack No.1	362518	5968203	626	36.6	2.10	22.80	439	2.64E+00	9.25E-01	3.14E-01	No	No
S129	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	HRSG Stack No.2	362518	5968225	626	36.6	2.10	22.80	439	2.64E+00	9.25E-01	3.14E-01	No	No
S130	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Granulation - West Train Process Unit - Reactor-Granulator-Cooler Tail Gas Scrubber Stack	362340	5968260	628	30.5	1.52	18.00	352	0.00E+00	0.00E+00	3.23E-01	No	No
S131	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Granulation - West Train Process Unit - Dryer Scrubber Stack	362339	5968246	627	35.1	2.13	8.00	330	1.13E+00	6.22E-01	2.85E-01	No	No
S132	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Granulation - West Train Process Unit - Dust Collection Baghouse Type Filter Exhaust Stack	362357	5968268	628	30.5	1.02	6.00	345	0.00E+00	0.00E+00	7.50E-02	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S133	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Phosphoric Acid D-665 Attack Tank Fume Scrubber Stack	362510	5968261	626	28.7	1.12	14.50	300	0.00E+00	0.00E+00	0.00E+00	No	No
S134	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Phosphoric Acid D-1014 North Filter Scrubber Stack	362509	5968292	626	28.7	1.22	8.50	299	0.00E+00	0.00E+00	0.00E+00	No	No
S135	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Phosphoric Acid D-675 South Filter Scrubber Stack	362511	5968323	627	28.7	2.13	18.70	300	0.00E+00	0.00E+00	0.00E+00	No	No
S136	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	High Pressure Still Bottoms Evaporator Stack	355771	5954744	623	24.5	0.79	33.52	330	0.00E+00	0.00E+00	0.00E+00	No	Yes
S137	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Boiler Exhaust Stack 3	355605	5954726	623	18.7	1.33	5.00	400	3.00E+01	1.01E+00	2.29E-02	No	No
S138	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Hydrogen Sulphide Scrubber Flare Stack	355616	5954659	623	20.4	0.50	1.50	1273	0.00E+00	0.00E+00	0.00E+00	No	No
S139	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Tail Gas Stack	355766	5954577	623	61.0	1.51	14.00	350	0.00E+00	0.00E+00	0.00E+00	No	No
S140	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Fume Scrubber Stack	355790	5954520	623	36.6	0.80	2.71	310	0.00E+00	0.00E+00	1.51E-03	No	No
S141	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Clark Compressor #2 Stack	355300	5954830	620	12.0	0.46	45.52	660	4.66E+00	9.81E-01	1.14E-02	No	No
S142	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Clark Compressor #3 Stack	357553	5959132	622	12.0	0.46	45.52	660	8.83E+00	4.75E-01	2.08E-02	No	No
S143	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Clark Compressor #4 Stack	357553	5959132	622	12.0	0.46	45.52	660	5.08E+00	7.28E-01	1.39E-02	No	No
S144	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Clark Compressor #5 Stack	357553	5959132	622	11.9	0.76	32.00	690	3.11E+00	1.09E+00	3.12E-02	No	No
S145	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Clark Compressor #6 Stack	357553	5959132	622	16.2	0.62	40.00	650	1.12E+01	1.38E+00	1.59E-02	No	No
S146	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Low Pressure Flare Stack	357553	5959132	622	15.5	0.11	0.00	950	3.10E-02	0.00E+00	0.00E+00	No	No
S147	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Vent Gas Scrubber Stack	357553	5959132	623	24.4	0.37	17.82	300	0.00E+00	0.00E+00	0.00E+00	No	No
S148	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Main Flare Stack	355347	5954877	620	21.0	0.46	0.00	950	4.35E+00	0.00E+00	0.00E+00	No	No
S149	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Powerhouse Clark Stack	355591	5954705	623	8.3	0.30	45.00	680	0.00E+00	0.00E+00	0.00E+00	No	No
S150	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Lime Bin Vent Filter 1 Exhaust Stack	355611	5954823	623	10.3	0.63	12.69	319	0.00E+00	0.00E+00	1.50E-03	No	No
S151	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Ammonia Storage Tank Emergency Flare Stack	355217	5955013	618	27.4	0.10	13.40	1273	9.49E-03	2.05E-02	4.80E-04	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S152	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Cobalt Sintering Furnaces Stack	355372	5954677	622	11.6	0.40	11.50	444	1.62E+00	3.47E-02	4.05E-02	No	No
S153	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Nickel Dryer and Sintering Furnace Stack	355728	5954626	623	7.3	0.35	24.70	444	2.66E+00	5.79E-02	6.66E-02	No	No
S154	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Oxydrolysis Tower Vent Condenser Stack	355692	5954600	623	7.0	0.36	5.63	358	0.00E+00	0.00E+00	0.00E+00	No	No
S155	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Lime Bin Vent Filter 2 Exhaust Stack	355618	5954820	623	10.3	0.63	12.69	319	0.00E+00	0.00E+00	1.50E-03	No	No
S156	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Granulation Unit Common Stack	355756	5954477	623	45.5	2.00	10.81	330	3.29E-01	5.14E-02	2.92E-01	No	No
S157	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Primary Reformer Exhaust Stack	355428	5954765	622	25.7	1.64	13.29	450	1.51E+00	1.42E+00	3.21E-02	No	No
S158	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Reduction Autoclave Flash Tanks Condenser Vent	355663	5954669	623	26.6	0.27	2.23	360	0.00E+00	0.00E+00	0.00E+00	No	No
S159	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Cobalt Separation Scrubber Stack	355657	5954703	623	27.5	0.34	30.00	300	0.00E+00	0.00E+00	0.00E+00	No	No
S160	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Dryer Scrubber Tank Exhaust Stack	355562	5954628	623	20.5	0.61	18.00	310	3.21E-02	6.42E-03	4.59E-02	No	No
S161	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Boiler Exhaust Stack 1	355559	5954739	623	22.0	2.10	7.00	450	1.15E+01	1.49E+00	3.38E-02	No	No
S162	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Boiler Exhaust Stack 2	355552	5954728	623	22.0	2.14	7.00	450	1.16E+01	1.45E+00	3.27E-02	No	No
S163	North West Redwater Holding Corp	Sturgeon Oil Refinery	Atmospheric Crude Unit (ACU) Heater Exhaust Stack	360312	5968310	634	65.0	2.05	15.00	554	2.50E+00	2.40E+00	4.64E-03	No	No
S164	North West Redwater Holding Corp	Sturgeon Oil Refinery	Hydrocarbon Flare Stack	360691	5968484	635	95.0	1.65	1.00	1473	7.71E+00	5.08E+00	1.43E-02	No	No
S165	North West Redwater Holding Corp	Sturgeon Oil Refinery	Acid Gas Flare Stack	360341	5968514	635	85.0	0.31	1.00	1473	4.99E-01	1.50E-01	4.22E-04	No	No
S166	North West Redwater Holding Corp	Sturgeon Oil Refinery	Tank Farm Incinerator Stack	359901	5967970	632	18.3	2.40	12.50	1148	4.00E-01	1.20E-01	3.38E-04	No	No
S167	North West Redwater Holding Corp	Sturgeon Oil Refinery	Sulphur Recovery Unit Incinerator Exhaust Stack	360341	5968514	635	85.0	1.83	17.98	923	2.51E+00	7.52E-01	2.12E-03	No	No
S168	North West Redwater Holding Corp	Sturgeon Oil Refinery	Heating Up Stack	360334	5968094	632	45.0	0.80	7.31	413	1.32E-01	3.16E-01	6.11E-04	No	No
S169	North West Redwater Holding Corp	Sturgeon Oil Refinery	Vacuum Crude Unit (VCU) Heater Exhaust Stack	360301	5968363	635	65.0	1.37	15.00	620	6.11E-01	1.03E+00	1.99E-03	No	No
S170	North West Redwater Holding Corp	Sturgeon Oil Refinery	Common Exhaust Stack for LC-Fining (LCF) Feed Heater and LCF Hydrogen Heater	360704	5967929	631	65.3	1.32	15.10	607	6.11E-01	7.41E-01	1.43E-03	No	No
S171	North West Redwater Holding Corp	Sturgeon Oil Refinery	LCF Atmospheric Heater Stack	360538	5968039	632	65.3	0.89	15.00	547	2.50E-01	3.68E-01	7.11E-04	No	No
S172	North West Redwater Holding Corp	Sturgeon Oil Refinery	LCF Vacuum Heater Stack	360513	5967920	632	65.3	1.01	15.20	641	3.06E-01	4.59E-01	8.87E-04	No	No
S173	North West Redwater Holding Corp	Sturgeon Oil Refinery	Common Exhaust Stack for Recycle Gas Heater, Product Fractionator Heater, and Hydrotreater Heater	360603	5968213	633	88.0	2.70	15.00	588	4.56E+00	4.23E+00	8.17E-03	No	No
S174	North West Redwater Holding Corp	Sturgeon Oil Refinery	Steam Boiler A Exhaust Stack	360284	5967998	632	33.5	2.00	18.45	436	4.67E+00	3.63E+00	7.02E-03	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S175	North West Redwater Holding Corp	Sturgeon Oil Refinery	Steam Boiler B Exhaust Stack	360283	5967982	632	33.5	2.00	18.45	436	4.67E+00	3.86E+00	7.47E-03	No	No
S176	North West Redwater Holding Corp	Sturgeon Oil Refinery	Steam Boiler C Exhaust Stack	360283	5967966	632	33.5	2.00	18.45	436	4.67E+00	3.87E+00	7.48E-03	No	No
S178	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Package Boiler #1 Stack	359111	5957414	628	15.2	2.13	1.89	436	3.39E+00	1.50E+00	3.39E-02	No	No
S179	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #8 Stack	359118	5957341	629	55.2	1.93	8.86	432	3.33E+00	2.15E-02	5.07E-02	No	No
S180	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #9 Stack	359133	5957340	629	55.2	1.93	8.86	432	3.33E+00	2.01E-02	5.39E-02	No	No
S181	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #10 Stack	359147	5957340	629	55.2	1.93	8.86	432	3.33E+00	2.01E-02	5.30E-02	No	No
S182	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #11 Stack	359162	5957339	629	55.2	1.93	8.86	432	3.33E+00	2.15E-02	5.36E-02	No	No
S183	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #12 Stack	359185	5957338	629	63.7	2.03	13.70	392	3.47E+00	3.19E-02	1.31E-01	No	No
S184	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Spent Caustic Incinerator Stack	359088	5957338	629	43.5	0.44	1.00	313	3.63E-01	1.60E-01	3.64E-03	No	No
S185	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Loading Vent Incinerator Stack	358785	5957150	629	17.1	1.88	3.10	1173	6.94E-02	3.40E-02	7.70E-04	No	No
S186	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Storage Tank Vent Incinerator Stack	358709	5957920	629	17.2	1.32	1.00	1173	4.58E-02	2.09E-02	4.44E-04	No	No
S187	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-1 Flare Stack	358950	5957817	632	75.8	2.18	9.40	860	1.86E-01	1.60E+00	4.28E-02	No	No
S188	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	CO2 Incinerator Stack	358809	5957482	629	27.4	2.44	4.30	1073	1.60E-01	1.05E-01	2.37E-03	No	No
S189	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Package Boiler #2 Stack	359111	5957393	628	15.2	2.13	1.89	436	3.24E+00	1.43E+00	3.24E-02	No	No
S190	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Brine Degas Incinerator Stack	358723	5958265	630	11.4	1.20	7.57	1033	4.07E-01	1.80E-01	4.06E-03	No	No
S191	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Fractionator Flare Stack	358841	5957876	630	61.0	2.03	10.26	856	1.51E-01	1.30E+00	4.82E-02	No	No
S192	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	NGL Dryer Regenerator Heater Stack	358830	5957577	629	20.4	0.76	1.30	508	4.25E-02	1.95E-01	4.42E-03	No	No
S193	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Wells Dowtherm Furnace Stack	357602	5957168	627	12.2	0.76	1.74	431	5.73E-02	2.53E-02	5.83E-04	Yes	No
S194	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Wells Flare Stack	357286	5957165	629	31.4	1.36	12.91	842	2.66E-02	2.27E-01	2.22E-04	No	No
S195	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Poly Furnace #1 Stack	357297	5955769	625	33.0	1.13	7.00	453	8.30E-01	3.67E-01	8.28E-03	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S196	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Poly Furnace #2 Stack	357321	5955766	625	46.0	1.46	5.70	493	1.53E+00	6.76E-01	1.53E-02	No	No
S197	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Poly Furnace #3 Stack	357314	5955731	625	46.0	1.47	5.70	473	1.57E+00	6.93E-01	1.56E-02	No	No
S198	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Poly Flare Stack	357267	5955950	625	42.7	0.91	0.70	873	1.15E-01	9.81E-01	5.10E-02	No	No
S199	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Combined Gas Turbine/ Heat Recovery Unit 101 Stack	356679	5956357	626	30.5	4.57	25.30	408	5.07E+00	1.97E+00	4.46E-02	No	No
S200	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #1 Stack	359022	5957340	629	43.5	1.77	8.08	441	3.33E+00	2.01E-02	5.54E-02	No	No
S201	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Combined Gas Turbine/ Heat Recovery Unit 201 Stack	356690	5956330	626	30.5	4.57	20.20	391	2.28E+01	9.38E+00	2.12E-01	No	No
S202	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	MEGlobal CO2 Vent	356869	5956401	625	47.5	0.51	27.00	533	0.00E+00	0.00E+00	0.00E+00	No	No
S203	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	EO Storage and Tank Car Depad Vent	356451	5956951	624	3.1	0.05	0.00	300	0.00E+00	0.00E+00	0.00E+00	No	No
S204	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Sweetwater Inert Vent	356953	5956510	625	15.2	0.05	210.00	368	0.00E+00	0.00E+00	0.00E+00	No	No
S205	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Glycol Vacuum Inerts Vent	356920	5956498	625	20.0	0.10	1.18	300	0.00E+00	0.00E+00	0.00E+00	No	No
S206	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Reactor Analyzer Vent	356915	5956404	625	18.3	0.05	0.21	298	0.00E+00	0.00E+00	0.00E+00	No	No
S207	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	T-7 Analyzer Vent	356820	5956562	625	4.6	0.13	15.00	298	0.00E+00	0.00E+00	0.00E+00	No	No
S208	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Glycol Evaporator Vent	356865	5956491	625	3.7	0.05	9.00	381	0.00E+00	0.00E+00	0.00E+00	No	No
S209	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	T-7 Light Ends Vent	356807	5956550	625	13.7	0.10	0.00	306	0.00E+00	0.00E+00	0.00E+00	No	No
S210	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Cycle Gas Vent	356883	5956442	625	18.3	0.20	0.00	323	0.00E+00	0.00E+00	0.00E+00	No	No
S211	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #2 Stack	359029	5957339	629	43.5	1.77	8.08	441	3.33E+00	2.04E-02	5.31E-02	No	No
S212	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Methane Purification Vent	356841	5956446	625	18.3	0.25	0.00	301	0.00E+00	0.00E+00	0.00E+00	No	No
S213	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Evaporator Reboiler Inert Vent	356967	5956510	625	1.2	0.05	0.00	403	0.00E+00	0.00E+00	0.00E+00	No	No
S216	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-1 Decarbonator Vent	359196	5957780	631	9.7	0.46	5.40	293	0.00E+00	0.00E+00	0.00E+00	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S217	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-1 Deaerator Vent #1	359163	5957759	631	9.7	0.08	1.80	293	0.00E+00	0.00E+00	0.00E+00	No	No
S218	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-1 Deaerator Vent #2	359175	5957758	631	9.7	0.08	1.80	293	0.00E+00	0.00E+00	0.00E+00	No	No
S219	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	ES Decarbonator Vent	356708	5956303	626	6.1	0.46	7.40	293	0.00E+00	0.00E+00	0.00E+00	No	No
S220	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Poly-2 Heater 4 Stack	357509	5956118	626	53.1	1.70	5.90	447	4.33E-01	1.49E-01	1.75E-02	No	No
S221	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Poly-2 Heater 5 Stack	357556	5956024	626	53.1	1.70	5.90	447	4.33E-01	1.49E-01	1.75E-02	No	No
S222	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #3 Stack	359051	5957339	629	43.5	1.77	8.08	441	3.33E+00	2.01E-02	5.26E-02	No	No
S223	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	SD-4511 A Vent	357515	5956075	626	20.0	1.10	7.10	293	0.00E+00	0.00E+00	0.00E+00	No	No
S224	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	SD-4511 B Vent	357516	5956078	626	20.0	1.10	7.10	293	0.00E+00	0.00E+00	0.00E+00	No	No
S225	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	SD-5511 A Vent	357562	5955981	627	20.0	1.10	7.10	293	0.00E+00	0.00E+00	0.00E+00	No	No
S226	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	SD-5511 B Vent	357563	5955983	627	20.0	1.10	7.10	293	0.00E+00	0.00E+00	0.00E+00	No	No
S227	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Poly-2 Flare Stack	357383	5955961	625	41.1	0.63	0.02	1286	6.42E-02	2.92E-01	1.13E-01	No	No
S228	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LP-8 Flare Stack	357311	5956295	625	59.0	0.56	0.26	1042	3.31E-01	1.51E+00	5.83E-01	No	No
S229	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Cracking Furnace #13 Stack	359313	5957322	631	63.7	2.30	19.10	396	1.46E+00	1.65E-01	1.65E-01	No	No
S230	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Cracking Furnace #14 Stack	359332	5957321	631	63.7	2.30	19.10	396	1.46E+00	1.65E-01	1.65E-01	No	No
S231	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Cracking Furnace #15 Stack	359351	5957321	631	63.7	2.30	19.10	396	1.46E+00	1.65E-01	1.65E-01	No	No
S232	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Cracking Furnace #16 Stack	359370	5957320	630	63.7	2.30	19.10	396	1.46E+00	1.65E-01	1.65E-01	No	No
S233	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #4 Stack	359058	5957338	629	43.5	1.77	8.08	441	3.33E+00	2.01E-02	5.60E-02	No	No
S234	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Cracking Furnace #17 Stack	359390	5957319	630	63.7	2.30	19.10	396	1.46E+00	1.65E-01	1.65E-01	No	No
S235	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Cracking Furnace #18 Stack	359409	5957319	630	63.7	2.30	19.10	396	1.46E+00	1.65E-01	1.65E-01	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S236	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Cracking Furnace #19 Stack	359428	5957319	630	63.7	2.30	19.10	396	1.46E+00	1.65E-01	1.65E-01	No	No
S237	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 LP Vent Incinerator Stack	359575	5957378	629	22.9	3.60	4.10	1073	4.80E-01	4.04E-01	9.14E-03	No	No
S238	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Spent Caustic Incinerator Stack	359084	5957335	629	40.2	0.90	1.00	313	3.63E-01	1.65E-01	3.64E-03	No	No
S239	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Ground Flare	359514	5957573	631	2.8	0.11	0.13	1226	3.69E-01	1.68E+00	9.24E-03	No	No
S240	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-2 Elevated Flare Stack	359576	5957393	629	18.3	0.45	0.17	1134	4.50E-02	1.55E-02	7.94E-02	No	No
S241	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	ATR Fired Heater Stack	358676	5957575	628	40.0	2.00	13.70	423	2.31E-01	7.94E-02	2.81E-02	No	No
S242	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	ATR Flare Stack	358552	5957566	629	115.0	1.98	0.02	1309	8.39E-02	3.83E-01	1.48E-01	No	No
S243	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #5 Stack	359080	5957337	629	43.5	1.77	8.08	441	3.33E+00	2.15E-02	5.09E-02	No	No
S244	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #6 Stack	359086	5957338	629	43.5	1.77	8.08	441	3.33E+00	2.00E-02	5.31E-02	No	No
S245	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Ethylene Cracking Furnace #7 Stack	359104	5957340	629	55.2	1.93	8.86	432	3.33E+00	1.96E-02	5.65E-02	No	No
S246	Access Pipeline Inc.	Sturgeon Bulk Petroleum Storage Terminal	29.3 kW Tank Heater 1 Exhaust Stack	360518	5967324	631	13.7	0.14	8.53	429	1.00E-03	8.60E-04	2.50E-05	No	No
S247	Access Pipeline Inc.	Sturgeon Bulk Petroleum Storage Terminal	29.3 kW Tank Heater 2 Exhaust Stack	360517	5967306	630	13.7	0.14	8.53	429	1.00E-03	8.60E-04	2.50E-05	No	No
S248	Air Products Canada Ltd.	Scotford Chemical (Hydrogen) Manufacturing Plant	SMR Furnace Stack	360700	5962713	626	30.5	4.00	15.40	400	8.17E+00	5.52E+00	6.24E-01	No	No
S249	Air Products Canada Ltd.	Scotford Chemical (Hydrogen) Manufacturing Plant	Flare Stack	360810	5962702	626	48.8	1.65	0.10	1165	2.43E-02	1.95E-01	1.89E-03	No	No
S250	Air Products Canada Ltd.	Scotford Chemical (Hydrogen) Manufacturing Plant	Diesel Generator	360746	5962769	626	1.5	0.05	0.50	373	1.76E-02	2.39E-02	2.12E-03	No	No
S251	Air Products Canada Ltd.	Scotford Chemical (Hydrogen) Manufacturing Plant	Process Steam Vent	360828	5962792	626	2.9	0.06	1.22	293	0.00E+00	0.00E+00	0.00E+00	No	No
S252	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	Alum Reactor Scrubber 1 Stack	355992	5954648	624	11.5	0.40	5.00	377	0.00E+00	0.00E+00	8.62E-02	No	No
S253	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	Alum Reactor Scrubber 2 Stack	355994	5954648	624	11.5	0.40	5.00	377	0.00E+00	0.00E+00	8.62E-02	No	No
S254	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	Alum Reactor Scrubber 3 Stack	355998	5954644	624	11.5	0.40	5.00	377	0.00E+00	0.00E+00	8.62E-02	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S255	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	Aluminum Trihydrate Baghouse Stack	355986	5954643	624	14.0	0.33	3.52	327	0.00E+00	0.00E+00	3.47E-03	No	No
S256	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	Sodium Bisulphite (SBS) Reactor Scrubber Stack	356005	5954647	624	5.5	0.27	1.43	301	0.00E+00	0.00E+00	0.00E+00	No	No
S257	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	Sulphonated Organics (MSX) Reactor Scrubber Stack	356033	5954680	624	6.7	0.14	11.30	313	0.00E+00	0.00E+00	0.00E+00	No	No
S258	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	Cooling Tower	355994	5954639	624	11.4	8.04	3.70	308	0.00E+00	0.00E+00	7.71E-04	No	No
S259	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	Cogeneration Unit 4F-202 Exhaust Stack	359756	5965749	635	27.4	2.74	29.47	449	3.61E+00	1.04E+00	8.52E-02	No	No
S260	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	55.2 MW Heat Medium Heater 4HR-201 Exhaust Stack	359140	5965720	637	21.3	3.51	6.10	555	8.83E-01	1.96E+00	7.50E-03	No	No
S261	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	Incinerator 4HR-204 Stack	359136	5965743	637	9.1	1.00	1.47	1123	5.31E-02	8.94E-02	8.06E-03	No	No
S262	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	RFS4 Flare 4F-202 Stack	359247	5965767	637	55.9	0.71	0.10	1312	2.78E-02	1.27E-01	4.92E-02	No	No
S263	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	64.6 MW Heat Medium Heater 2HR-201 Exhaust Stack (RFSII)	359629	5965705	636	38.2	3.30	5.90	435	2.44E+00	4.21E+00	9.52E-02	No	No
S264	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	Glycol Regeneration Heater 2HR-203 Exhaust Stack	359655	5965694	635	6.1	2.09	0.08	435	2.83E-02	2.38E-02	5.28E-04	No	No
S265	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	Incinerator 2HR-204 Stack (RFSII)	359662	5965723	636	13.7	1.61	3.60	1123	2.78E-01	2.19E-01	6.62E-02	No	No
S266	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	64.6 MW Heat Medium Heater 3HR-201 Exhaust Stack (RFSIII)	359623	5965767	637	21.3	3.51	6.10	555	2.44E+00	1.63E+00	3.68E-02	No	No
S267	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	Incinerator 3HR-204 Stack (RFSIII)	359665	5965739	636	9.1	1.00	4.53	1123	5.32E-02	8.93E-02	8.08E-03	No	No
S268	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	Flare F-202 Stack (RFS II/III)	359576	5965747	637	57.9	1.83	0.10	1194	1.99E-01	1.08E+00	3.79E-01	No	No
S269	Pembina NGL Corporation	Redwater Fractionation Facilities 2, 3 and 4	Brine Pond Excess Gas Burner Exhaust Stack	359455	5966403	635	3.0	0.05	0.14	1311	1.11E-02	5.06E-02	1.94E-02	No	No
S270	ATCO Energy Solutions Ltd.	Strathcona Salt Cavern Storage Project and Brine Storage Pond	Degasification Flare Stack	365573	5962416	626	19.9	0.20	0.10	1189	1.37E-03	7.43E-03	2.41E-03	No	No
S271	MEG Energy Corp.	Bruderheim Bulk Petroleum Storage Terminal and Diluent Removal Facility	9.76 MW Heater 1 Exhaust Stack	366719	5961173	630	23.5	1.30	5.50	583	2.06E-01	3.46E-01	3.13E-02	No	No
S272	MEG Energy Corp.	Bruderheim Bulk Petroleum Storage Terminal and Diluent Removal Facility	9.76 MW Heater 2 Exhaust Stack	366773	5961193	630	23.5	1.30	5.50	583	2.06E-01	3.46E-01	3.13E-02	No	No
S273	MEG Energy Corp.	Bruderheim Bulk Petroleum Storage Terminal and Diluent Removal Facility	9.76 MW Heater 3 Exhaust Stack	366827	5961213	630	23.5	1.30	5.50	583	2.06E-01	3.46E-01	3.13E-02	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S274	MEG Energy Corp.	Bruderheim Bulk Petroleum Storage Terminal and Diluent Removal Facility	Railcar Vapour Incinerator Stack	367669	5961622	630	12.2	0.25	34.70	1423	3.06E-01	5.15E-01	4.66E-02	No	No
S275	MEG Energy Corp.	Bruderheim Bulk Petroleum Storage Terminal and Diluent Removal Facility	Emergency Flare Stack	366961	5961482	628	5.2	0.50	0.44	442	2.36E-03	3.55E-03	4.26E-03	No	No
S276	Pembina Marketing Ltd.	Canadian Diluent Hub Bulk Petroleum Storage Terminal	Flare Stack	363105	5960652	629	45.0	0.10	0.80	1243	3.65E-01	1.98E+00	6.42E-01	No	No
S279	Inter Pipeline Propylene Ltd.	Heartland Petrochemical Complex 116 MW Cogeneration Power Plant	441 GJ/h Heat Recovery Steam Generator 1 Exhaust Stack	359599	5961201	634	45.0	3.20	20.20	369	4.33E+00	1.49E+00	1.68E-02	No	No
S280	Inter Pipeline Propylene Ltd.	Heartland Petrochemical Complex 116 MW Cogeneration Power Plant	441 GJ/h Heat Recovery Steam Generator 2 Exhaust Stack	359598	5961153	634	45.0	3.20	20.20	369	4.33E+00	1.34E+00	1.55E-02	No	No
S281	Inter Pipeline Propylene Ltd.	Heartland Petrochemical Complex 116 MW Cogeneration Power Plant	366 GJ/hour Auxiliary Boiler 1 Exhaust Stack	359569	5961193	634	30.0	2.00	17.10	422	2.03E+00	8.64E-01	2.44E-03	No	No
S282	Inter Pipeline Propylene Ltd.	Heartland Petrochemical Complex 116 MW Cogeneration Power Plant	366 GJ/hour Auxiliary Boiler 2 Exhaust Stack	359585	5961192	634	30.0	2.00	17.10	422	2.03E+00	8.31E-01	2.35E-03	No	No
S283	Inter Pipeline Propylene Ltd.	Heartland Petrochemical Complex 116 MW Cogeneration Power Plant	3.87 GJ/hour Natural Gas Fired Fuel Gas Heater Exhaust Stack	359563	5961154	634	7.3	0.61	2.80	473	8.89E-02	5.42E-02	3.33E-03	No	No
S284	Value Creation Inc.	VCS Heartland Bulk Petroleum Storage Terminal	Emergency Flare Stack	365894	5964823	625	60.0	0.39	2.90	1265	4.10E-03	1.26E-02	4.58E-03	No	No
S285	TransAlta Generation Partnership and Prairie Boys Capital Corporation	Fort Saskatchewan 118 MW Thermal Electric (Cogeneration) Power Plant	Cogen Power Plant Exhaust Stack	356654	5956398	625	32.3	4.70	20.20	391	2.17E+01	2.35E+00	7.70E-01	No	No
S286	TransAlta Generation Partnership and Prairie Boys Capital Corporation	Fort Saskatchewan 118 MW Thermal Electric (Cogeneration) Power Plant	Cooling Tower 1	356560	5956444	625	13.8	7.70	6.20	308	0.00E+00	0.00E+00	9.05E-03	No	No
S287	TransAlta Generation Partnership and Prairie Boys Capital Corporation	Fort Saskatchewan 118 MW Thermal Electric (Cogeneration) Power Plant	Cooling Tower 2	356565	5956432	625	13.8	7.70	6.20	308	0.00E+00	0.00E+00	9.05E-03	No	No
S288	TransAlta Generation Partnership and Prairie Boys Capital Corporation	Fort Saskatchewan 118 MW Thermal Electric (Cogeneration) Power Plant	Cooling Tower 3	356576	5956437	625	13.8	7.70	6.20	308	0.00E+00	0.00E+00	9.05E-03	No	No
S289	TransAlta Generation Partnership and Prairie Boys Capital Corporation	Fort Saskatchewan 118 MW Thermal Electric (Cogeneration) Power Plant	Cooling Tower 4	356570	5956449	625	13.8	7.70	6.20	308	0.00E+00	0.00E+00	9.05E-03	No	No
S290	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	21705 Tail Gas Incinerator Stack	361708	5963043	624	90.0	3.36	18.00	689	3.06E+00	1.36E+00	3.83E-03	No	No
S291	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	41703 Acid Gas Flare Stack	361786	5963610	624	90.0	0.61	1.00	1273	1.08E+00	3.23E-01	9.11E-04	No	No
S292	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	21105 Vacuum Heater Stack	361720	5963437	623	68.0	1.53	20.00	498	2.25E+00	2.22E+00	6.00E-03	No	No
S293	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	41106 Atmos Heater Stack	361706	5964278	620	66.0	2.40	20.50	475	9.83E-01	1.56E+00	5.56E-03	No	No
S294	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	41107 Vac Heater Stack	361695	5964062	623	68.0	1.53	20.00	498	6.42E-01	1.25E+00	4.06E-03	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S295	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	22206/22306 B RHC Stack	361649	5963228	624	65.0	1.84	19.20	553	4.99E+00	1.50E+00	4.22E-03	No	No
S296	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	27201/02 HC Flare Stack	361639	5962858	624	76.2	0.76	2.10	1273	8.02E-01	2.41E-01	6.78E-04	No	No
S297	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	42206 RHC Stack	361872	5963992	622	65.0	1.84	19.20	675	1.16E+01	3.44E+00	1.11E-02	No	No
S298	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	47201 HC Flare Stack	362067	5964197	624	95.0	1.22	0.80	1273	7.35E-02	2.21E-02	6.22E-05	No	No
S299	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	Water Cooling Tower	362115	5963223	623	12.6	8.53	7.90	293	0.00E+00	0.00E+00	2.78E-03	No	No
S300	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	Vapour Combustion Unit Stack	361485	5964028	621	19.8	1.22	0.30	1253	1.97E-01	3.36E-01	2.43E-02	No	No
S301	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	41705 Tail Gas Incinerator Stack	361700	5963768	625	90.0	2.59	18.00	742	1.61E+00	3.49E-01	9.83E-04	No	No
S302	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	21104 Base Plant Atmospheric Column Change Heater Exhaust Stack	361677	5963407	623	66.0	3.47	22.00	485	6.39E+00	4.23E+00	1.19E-02	No	No
S303	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	24103 HMU Steam Reformer Stack	361976	5962936	625	66.0	4.00	10.00	447	2.13E+01	4.63E+00	1.28E-02	No	No
S304	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	24203 HMU Steam Reformer Stack	362019	5963033	625	66.0	4.00	10.00	433	2.13E+01	8.97E+00	1.99E-02	No	No
S305	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	45114 Package Steam Boiler Stack	361995	5963780	625	45.0	1.80	10.00	394	4.47E+00	7.83E-01	2.21E-03	No	No
S306	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	44103 HMU Steam Reformer Stack	362051	5964036	622	50.0	4.50	13.80	443	3.61E+01	7.58E+00	2.14E-02	No	No
S307	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	CO2 Vent Stack	362172	5963009	625	50.0	1.21	9.99	579	0.00E+00	0.00E+00	0.00E+00	No	No
S308	Shell Canada Limited	Scotford Oil Sands Processing Plant (Bitumen Upgrader)	21703 Acid Gas Flare Stack	361530	5962865	625	85.0	0.61	1.20	1273	2.55E-01	7.64E-02	2.15E-04	No	No
S309	Shell Canada Products	Scotford Refinery	Utilities B-5101A/B Stack	362162	5962444	625	45.7	0.50	10.00	415	3.76E+00	1.59E+00	3.59E-02	No	No
S310	Shell Canada Products	Scotford Refinery	NHT (Naphtha Hydrotreating Unit) H-3101 Stack	361808	5962407	625	45.7	0.89	10.00	393	3.38E-01	4.15E-01	9.39E-03	No	No
S311	Shell Canada Products	Scotford Refinery	CCR (Continuous Catalytic Reformer) H-3201/02/03; H-3204 A/B/C Stack	361732	5962437	625	45.7	0.50	10.00	393	6.74E+00	3.90E+00	8.82E-02	No	No
S312	Shell Canada Products	Scotford Refinery	HAD (Hydrodealkylation Unit) H-4201 A/B Stack	362022	5962409	625	45.7	0.50	10.00	393	8.11E-01	6.81E-01	1.38E-02	No	No
S313	Shell Canada Products	Scotford Refinery	Flare S-7201 Stack	361638	5962855	624	62.4	0.91	10.00	773	9.25E-01	5.09E+00	7.56E-02	No	No
S314	Shell Canada Products	Scotford Refinery	CCR Regenerator Vent Stack	361732	5962437	625	15.2	0.15	2.60	748	0.00E+00	0.00E+00	0.00E+00	No	No
S315	Shell Canada Products	Scotford Refinery	Polaris Boiler Flue Gas Stack	362345	5963019	625	30.0	1.88	19.60	341	1.64E+00	3.68E+00	3.36E-02	No	No
S316	Shell Canada Products	Scotford Refinery	Polaris Boiler Flue Gas Quench and CO2 Absorption System Vent Stack	362301	5962726	625	71.0	0.55	8.53	429	0.00E+00	0.00E+00	0.00E+00	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S317	Shell Canada Products	Scotford Refinery	SMR Flue Gas Quench and CO2 Absorpotion System Vent Stack	362298	5962693	625	78.0	0.55	8.53	429	0.00E+00	0.00E+00	0.00E+00	No	No
S318	Shell Canada Products	Scotford Refinery	ADU (Atmospheric Distillation Unit) H-1101 Stack	361996	5962572	624	45.7	1.40	10.00	393	9.16E+00	4.05E+00	9.16E-02	No	No
S319	Shell Canada Products	Scotford Refinery	HOS (Hot Oil System) H-1501 Stack	361903	5962572	625	45.7	1.50	10.00	393	1.11E+00	9.33E-01	2.11E-02	No	No
S320	Shell Canada Products	Scotford Refinery	DHT (Diesel Hydrotreater) H-2001 Stack	361985	5962627	625	49.2	0.77	10.00	393	2.42E-01	2.03E-01	4.60E-03	No	No
S321	Shell Canada Products	Scotford Refinery	SMR (Steam Methane Reformer) H-2101/2102 Stack	362018	5962808	625	45.7	0.50	10.00	663	1.84E+01	2.01E+01	4.54E-01	No	No
S322	Shell Canada Products	Scotford Refinery	HCU 1 (Hydro Cracker Unit) H-2201/2202 Stack	361738	5962835	624	45.7	0.51	10.00	408	8.62E-01	7.24E-01	1.64E-02	No	No
S323	Shell Canada Products	Scotford Refinery	HCU 2 (Hydro Cracker Unit) H-2301/2302 Stack	361736	5962755	624	45.7	0.51	10.00	408	7.65E-01	6.42E-01	1.45E-02	No	No
S324	Shell Canada Products	Scotford Refinery	HCU Frac (Hydro Cracker Fractionater) H-2401/2402 Stack	361733	5962686	624	45.7	0.51	10.00	408	4.22E+00	1.87E+00	4.22E-02	No	No
S325	Shell Canada Products	Scotford Refinery	DHU (Distillate Hydrogenation Unit) H-2501 Stack	361943	5962630	624	45.7	0.60	10.00	582	1.74E-01	1.16E-01	2.63E-03	No	No
S326	Air Liquide Canada Inc.	Air Liquide Scotford Complex	Gas Turbine / HRSG Exhaust Stack	362716	5963163	624	32.3	5.60	14.40	438	1.75E+01	3.64E-01	1.31E-01	No	No
S327	Air Liquide Canada Inc.	Air Liquide Scotford Complex	Auxiliary Boiler Exhaust Stack	362698	5963163	624	22.9	1.80	4.43	408	1.04E+00	1.04E+00	1.83E-02	No	No
S328	Air Liquide Canada Inc.	Air Liquide Scotford Complex	Chiller Tower	362563	5963111	624	15.2	3.50	2.50	296	0.00E+00	0.00E+00	2.00E-03	No	Yes
S329	Air Liquide Canada Inc.	Air Liquide Scotford Complex	Carbon Dioxide Plant Distillation Tower	362644	5963127	624	12.9	0.50	4.50	295	0.00E+00	0.00E+00	0.00E+00	No	No
S330	Air Liquide Canada Inc.	Air Liquide Scotford Complex	Cooler Tower 1	362591	5963070	624	15.2	7.60	8.50	299	0.00E+00	0.00E+00	2.00E-03	No	No
S331	Air Liquide Canada Inc.	Air Liquide Scotford Complex	Cooler Tower 2	362602	5963070	624	15.2	7.60	8.50	299	0.00E+00	0.00E+00	2.00E-03	No	No
S332	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Vent Condenser Stack AU-01	355506	5954743	623	11.6	0.20	3.00	303	0.00E+00	0.00E+00	0.00E+00	No	No
S333	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Leach Tank UC-TK-51 Vent	355525	5954758	623	7.4	0.08	1.64	350	0.00E+00	0.00E+00	0.00E+00	No	No
S334	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Leach Tank UC-TK-53 Vent	355524	5954756	623	7.4	0.08	1.64	357	0.00E+00	0.00E+00	0.00E+00	No	No
S335	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Leach Tank UC-TK-55 Vent	355515	5954750	623	10.4	0.15	0.41	358	0.00E+00	0.00E+00	0.00E+00	Yes	No
S336	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Natural Gas Fired Heater Stack PU-FR-187	355507	5954713	623	10.0	0.30	3.26	425	1.05E-01	8.93E-02	2.63E-03	No	No
S337	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Natural Gas Fired Heater Stack U-FR-188	355505	5954714	623	10.0	0.30	3.26	425	1.05E-01	8.93E-02	2.63E-03	No	No
S338	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Vent Condenser Stack AU-02	355506	5954741	623	11.6	0.20	3.40	305	0.00E+00	0.00E+00	0.00E+00	No	No
S339	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Dust Collector Exhaust Stack UC-DC-01	355509	5954780	622	0.5	0.31	6.00	305	0.00E+00	0.00E+00	3.68E-01	No	Yes
S340	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Dust Collector Exhaust Stack UC-DC-06	355505	5954771	622	5.5	0.31	6.10	300	0.00E+00	0.00E+00	1.25E-01	No	Yes

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S341	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Dust Collector Exhaust Stack UC-DC-07	355483	5954727	622	4.3	0.31	5.00	305	0.00E+00	0.00E+00	1.76E-01	Yes	No
S342	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Dust Collector Exhaust Stack UC-DC-40	355513	5954749	623	8.1	0.20	27.40	305	0.00E+00	0.00E+00	4.41E-01	No	Yes
S343	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Dust Collector Exhaust Stack UC-DC-50	355483	5954776	622	9.1	0.36	4.20	308	0.00E+00	0.00E+00	1.36E-01	No	Yes
S344	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Aqua Scrubber Vent	355496	5954726	623	9.0	0.10	0.10	288	0.00E+00	0.00E+00	0.00E+00	Yes	No
S345	Secure Energy Services Inc.	Redwater Hazardous Waste and Recyclables Storage and Processing Facility	Natural Gas Fired Boiler 1 Stack	362944	5980095	623	3.6	0.55	8.53	429	2.34E-01	1.11E-01	1.91E-02	No	No
S346	Secure Energy Services Inc.	Redwater Hazardous Waste and Recyclables Storage and Processing Facility	Natural Gas Fired Boiler 2 Stack	362958	5980080	623	3.6	0.55	8.53	429	2.34E-01	1.11E-01	1.91E-02	No	No
S347	Secure Energy Services Inc.	Redwater Hazardous Waste and Recyclables Storage and Processing Facility	Thermal Oxidizer Exhaust Stack	362973	5980065	623	12.8	1.78	4.51	1041	1.51E-01	1.16E+00	5.81E-02	No	No
S348	Shell Chemicals Canada	Scotford Chemicals Facility	CO2 Stripper Vent Stack	362687	5963519	625	54.4	0.45	8.20	298	0.00E+00	0.00E+00	0.00E+00	No	No
S349	Shell Chemicals Canada	Scotford Chemicals Facility	Mechanical Vacuum System Vent	362787	5963747	625	20.0	1.00	5.00	500	0.00E+00	0.00E+00	0.00E+00	Yes	No
S350	Shell Chemicals Canada	Scotford Chemicals Facility	EB Reactor Pressure Control Valve	362708	5963705	625	20.0	1.00	5.00	500	0.00E+00	0.00E+00	0.00E+00	No	No
S351	Shell Chemicals Canada	Scotford Chemicals Facility	Ethylene Oxide Vent Absorber Stack	362687	5963519	625	30.0	1.00	5.00	500	0.00E+00	0.00E+00	0.00E+00	Yes	No
S352	Shell Chemicals Canada	Scotford Chemicals Facility	EG Vacuum System Vent Stack	362687	5963519	625	20.0	1.00	5.00	500	0.00E+00	0.00E+00	0.00E+00	No	No
S353	Shell Chemicals Canada	Scotford Chemicals Facility	EG Water Surge Drum Vent	362687	5963519	625	20.0	1.00	5.00	500	0.00E+00	0.00E+00	0.00E+00	Yes	No
S354	Shell Chemicals Canada	Scotford Chemicals Facility	Benzene Vapour Recovery Unit Vent	362889	5963846	624	5.0	0.25	2.60	283	0.00E+00	0.00E+00	0.00E+00	No	No
S355	Shell Chemicals Canada	Scotford Chemicals Facility	Ethylebenzene Reactor Heater Stack 101/102	362832	5963761	625	50.0	1.60	10.00	468	1.41E+00	9.86E-01	3.68E-02	No	No
S356	Shell Chemicals Canada	Scotford Chemicals Facility	Common Stack for Reboilers 103/4/5	362946	5963781	624	76.2	1.65	11.20	413	3.90E+00	2.01E+00	4.80E-02	No	No
S357	Shell Chemicals Canada	Scotford Chemicals Facility	Steam Superheater Stack	362851	5963721	625	78.0	2.74	5.00	473	1.05E+01	4.91E+00	2.04E-01	No	No
S358	Shell Chemicals Canada	Scotford Chemicals Facility	Utility Boilers Stack	362751	5963794	625	30.5	1.90	6.40	378	2.01E+00	1.48E+00	1.89E-01	No	No
S359	Shell Chemicals Canada	Scotford Chemicals Facility	Flare Stack	362550	5963807	625	80.2	0.90	53.40	1273	2.01E-01	1.86E+00	4.95E-06	No	No
S360	Shell Chemicals Canada	Scotford Chemicals Facility	Benzene Vapour Combustion Unit Outlet Stack	362889	5963846	624	13.3	1.70	5.20	1143	5.66E-03	3.89E-03	1.23E-03	Yes	No
S361	Shell Chemicals Canada	Scotford Chemicals Facility	Cooling Water Tower	362572	5963958	624	18.0	18.00	9.80	300	0.00E+00	0.00E+00	7.28E-03	No	No
S362	Shell Chemicals Canada	Scotford Chemicals Facility	HS-102 Regeneration Heater Stack	362806	5963784	625	30.6	0.50	3.40	823	3.47E-02	1.98E-02	6.94E-04	No	No
S363	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Prepress Cooker Scrubber Stack	352549	5955627	640	19.2	0.63	18.20	281	0.00E+00	0.00E+00	7.11E-01	No	No
S364	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Extractor, Distillation System Stack	352556	5955585	640	20.1	0.15	0.52	303	0.00E+00	0.00E+00	0.00E+00	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S365	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Meal Pelletizing System Cyclone Stack 2	352556	5955585	640	10.7	0.43	32.70	308	0.00E+00	0.00E+00	5.39E-01	No	Yes
S366	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Seed Cleaning and Handling Baghouse Handling Stack	352517	5955651	641	8.0	1.03	8.50	293	0.00E+00	0.00E+00	2.89E-01	No	Yes
S367	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Meal Hammermill Baghouse Stack	352516	5955570	640	8.7	0.34	15.30	313	0.00E+00	0.00E+00	1.61E-01	No	Yes
S368	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Meal Pelletizing System Cyclone Stack 1	352526	5955600	640	10.7	0.43	32.70	308	0.00E+00	0.00E+00	5.39E-01	No	Yes
S369	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Seed Preheater Cyclone Stack	352553	5955652	641	6.5	0.37	22.20	333	0.00E+00	0.00E+00	2.50E-01	No	No
S370	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Seed Flaker Aspiration Cyclone Stack	352527	5955621	641	17.0	0.69	21.60	319	0.00E+00	0.00E+00	8.86E-01	No	No
S371	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	DTDC Meal Dryer-Cooler Cyclone Stack	352558	5955568	640	10.5	0.78	12.60	325	0.00E+00	0.00E+00	6.53E-01	Yes	Yes
S372	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Pneumatic Dockage Conveying System Baghouse Stack	352541	5955639	641	17.0	0.20	12.00	293	0.00E+00	0.00E+00	4.72E-02	No	Yes
S373	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Boilers 1 and 2 Common Exhaust Stack	352519	5955610	641	21.3	1.52	4.40	513	8.89E-01	1.10E+00	2.47E-02	No	No
S374	Prospec Chemicals - Division of Charles Tennant & Company (Canada) Ltd.	Fort Saskatchewan Xanthate and Xanthate Derivatives Chemical Manufacturing Plant	Regenerative Thermal Oxidizer Stack	353128	5957714	644	10.4	0.51	28.08	561	1.23E-01	1.42E+00	3.36E-03	No	No
S375	Prospec Chemicals - Division of Charles Tennant & Company (Canada) Ltd.	Fort Saskatchewan Xanthate and Xanthate Derivatives Chemical Manufacturing Plant	Makeup Air Unit Stack	353140	5957656	644	3.0	0.20	2.90	400	1.07E-02	8.95E-03	8.10E-04	Yes	No
S376	Prospec Chemicals - Division of Charles Tennant & Company (Canada) Ltd.	Fort Saskatchewan Xanthate and Xanthate Derivatives Chemical Manufacturing Plant	Laboratory Fume Hood Exhaust Vent	353134	5957685	644	2.6	0.19	0.77	293	0.00E+00	0.00E+00	0.00E+00	No	No
S377	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	76,547 kW Heat Medium Heater Exhaust Stack	359723	5965066	638	38.0	3.49	3.66	423	1.99E+00	4.95E-01	1.12E-02	No	No
S378	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	Brine Pond Excess Gas Burner 2 Exhaust Stack	359568	5964920	637	2.0	6.00	0.10	300	1.56E-03	8.42E-03	2.94E-03	No	No
S379	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	4,532 kW ROF De-Ethanizer Project Heater Exhaust Stack	359694	5965004	638	25.9	0.93	7.62	585	1.18E-01	1.17E-01	2.64E-03	No	No
S380	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	1,548 kW ROF De-Ethanizer Project Heater Exhaust Stack	359705	5965004	638	18.1	0.46	8.60	725	4.03E-02	3.77E-02	8.61E-04	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S381	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	9,517 kW Ethylene Handling Project Heater Exhaust Stack	359724	5965043	638	7.6	0.61	24.60	614	2.47E-01	6.15E-02	1.39E-03	Yes	No
S382	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	1,670 kW ROF Debottleneck Project Heater Exhaust Stack	359420	5965064	639	14.6	0.74	6.38	1019	4.28E-02	1.08E-02	2.50E-04	No	No
S383	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	20,680 kW ROF Debottleneck Heater Exhaust Stack	359424	5965076	639	26.3	1.83	5.92	641	5.38E-01	1.34E-01	3.03E-03	No	No
S384	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	675 kW ROF Debottleneck Project SRU Thermal Oxidizer Exhaust Stack	359422	5965052	639	15.2	0.46	12.65	1044	1.59E+00	4.76E-01	1.08E-02	No	No
S385	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	4,267 kW Propane Regeneration Heater Exhaust Stack	359113	5964797	641	22.0	0.87	6.40	570	7.46E-02	9.18E-02	2.08E-03	No	No
S386	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	Pembina General Flare Stack	359721	5964960	637	54.9	0.61	0.10	1573	1.20E+00	6.50E+00	2.28E+00	No	No
S387	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	Tube Storage Flare Stack	359649	5963844	623	14.0	0.15	0.10	1573	1.21E-02	6.57E-02	2.30E-02	No	No
S388	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	1,147 kW Propane Regen Gas Heater Exhaust Stack	359696	5965050	638	9.4	0.59	3.90	725	3.14E-01	3.86E-01	8.72E-03	No	No
S389	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	Propane Flare Stack	359649	5963844	623	45.7	1.50	0.00	1195	1.55E-01	8.42E-01	2.95E-01	No	No
S390	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	2,634 kW Propylene Regeneration Heater Exhaust Stack	359802	5965097	638	8.5	0.41	11.48	560	1.25E-01	8.75E-02	3.75E-03	No	No
S391	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	Brine Pond Excess Gas Burner 2 Exhaust Stack	358622	5964651	642	4.3	4.51	0.42	1282	4.20E-02	8.44E-03	2.97E-03	No	No
S392	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	508 kW Glycol Regen Heater Exhaust Stack	359696	5965067	638	14.6	0.46	0.10	725	4.40E-02	4.45E-02	1.00E-03	No	No
S393	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	1,911 kW Ethane Regen Gas Heater #1 Exhaust Stack	359693	5965060	638	9.5	0.79	3.80	725	4.97E-02	8.30E-03	1.88E-04	No	No
S394	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	1,911 kW Ethane Regen Gas Heater #2 Exhaust Stack	359693	5965056	638	9.5	0.79	0.10	725	4.97E-02	8.30E-03	1.88E-04	No	No

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S395	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	1,911 kW Ethane/Propane Gas Heater #1 Exhaust Stack	359693	5965042	638	9.5	0.79	0.10	725	4.97E-02	5.20E-03	1.17E-04	No	No
S396	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	1,911 kW Ethane/Propane Gas Heater #2 Exhaust Stack	359693	5965037	638	9.5	0.79	3.80	725	4.97E-02	5.20E-03	1.17E-04	No	No
S397	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	1,715 kW ROF Regen Gas Heater Exhaust Stack	359722	5965053	638	9.1	0.76	0.65	989	4.39E-02	2.63E-02	5.83E-04	No	No
S398	Pembina NGL Corporation	Redwater Fractionation and Storage I (RFS I) Facility and Redwater Olefins Facility	Acid Gas/Waste Gas Incinerator Stack	359692	5965025	638	15.5	1.83	9.55	1146	9.02E-01	3.18E-01	5.24E-02	No	No
S399	Aux Sable Canada Ltd.	Aux Sable Canada Ltd.-Heartland Offgas Project	Heat Medium Heater (14 MMBtu/h)	359370	5960305	634	4.6	0.61	8.30	406	6.83E-01	5.75E-01	4.63E-02		
S400	Aux Sable Canada Ltd.	Aux Sable Canada Ltd.-Heartland Offgas Project	Heat Medium Heater (14 MMBtu/h)	359370	5960310	634	4.6	0.61	8.30	406	6.83E-01	5.75E-01	4.63E-02		
S401	Aux Sable Canada Ltd.	Aux Sable Canada Ltd.-Heartland Offgas Project	Heat Medium Heater (14 MMBtu/h)	359370	5960315	634	4.6	0.61	8.30	406	6.83E-01	5.75E-01	4.63E-02		
S402	Evonik Canada Inc	Evonik Degussa-Gibbons Hydrogen Peroxide	Boiler 1 Stack	359779	5967407	634	18.3	0.63	12.60	449	2.87E-01	1.18E-01	2.80E-02		
S403	Evonik Canada Inc	Evonik Degussa-Gibbons Hydrogen Peroxide	Boiler 2 Stack	359750	5967431	633	10.0	0.85	6.70	489	2.41E-01	2.01E-01	2.80E-02		
S404	Evonik Canada Inc	Evonik Degussa-Gibbons Hydrogen Peroxide	Hydrogen Plant Stack	359818	5967432	634	21.1	0.76	13.30	455	1.44E-01	2.48E-01	3.10E-02		
S405	Tidewater Midstream and Infrastructure Ltd.	Tidewater Midstream and Infrastructure Ltd. - Fort Saskatchewan Sour Gas Plant	Regenerator Gas Heater (466 kW)	355890	5953580	624	7.2	0.45	3.20	876	0.00E+00	0.00E+00	0.00E+00		
S406	Tidewater Midstream and Infrastructure Ltd.	Tidewater Midstream and Infrastructure Ltd. - Fort Saskatchewan Sour Gas Plant	Glycol Heater (170 kW)	355830	5953605	624	4.9	0.39	3.09	529	7.79E-02	1.16E-02	2.80E-02		
S407	Tidewater Midstream and Infrastructure Ltd.	Tidewater Midstream and Infrastructure Ltd. - Fort Saskatchewan Sour Gas Plant	Continuous Flare	355910	5953600	624	30.1	0.36	0.10	1273	0.00E+00	0.00E+00	0.00E+00		
S408	ATCO Energy Solutions Ltd	ATCO Heartland Energy Center	Gas Turbine	365543	5961511	633	50.0	6.46	21.00	351	7.18E+00	8.53E+00	2.52E+00		
S409	ATCO Energy Solutions Ltd	ATCO Heartland Energy Center	Auxiliary Boiler	365509	5961451	633	15.0	1.40	7.50	421	5.09E-01	2.43E+00	5.79E-02		
S410	Value Creation Inc.	Heartland Bitumen Upgrader	Phase 1 - DRU Heater 1	365401	5965645	627	100.0	1.60	13.60	443	5.33E-01	3.20E+00	1.74E-01		
S411	Value Creation Inc.	Heartland Bitumen Upgrader	Phase 1 - Boiler 1	365401	5965645	627	100.0	2.05	23.00	443	4.86E-01	2.92E+00	2.43E-01		
S412	Value Creation Inc.	Heartland Bitumen Upgrader	Phase 1 - Boiler 2	365401	5965645	627	100.0	2.05	23.00	443	8.06E-02	4.83E-01	2.43E-01		
S419	Value Creation Inc.	Heartland Bitumen Upgrader	Phase 2 - DRU Heater 2	366229	5965652	624	50.0	1.27	21.50	443	1.08E+00	6.50E+00	1.74E-01		
S420	Value Creation Inc.	Heartland Bitumen Upgrader	Phase 2 - Boiler 3	366246	5965612	624	50.0	1.71	20.10	443	2.00E+00	1.20E+01	2.89E-01		
S421	Value Creation Inc.	Heartland Bitumen Upgrader	Phase 2 - Boiler 4	366236	5965635	624	50.0	1.71	20.10	443	2.00E+00	1.20E+01	2.89E-01		

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S428	Value Creation Inc.	Heartland Bitumen Upgrader	Phase 3 - DRU Heater 3	366063	5965439	624	50.0	1.27	21.50	443	1.08E+00	6.50E+00	1.74E-01		
S429	Value Creation Inc.	Heartland Bitumen Upgrader	Phase 3 - Boiler 5	366106	5965443	624	50.0	1.71	20.10	443	2.00E+00	1.20E+01	2.89E-01		
S446	Inter Pipeline Propylene Ltd.	PDH	No 1 Interheater	359602	5961055	634	74.0	2.00	5.90	450	9.25E-01	8.10E-02	7.63E-02		
S447	Inter Pipeline Propylene Ltd.	PDH	No 2 Interheater	359579	5961056	634	74.0	1.80	5.50	453	6.94E-01	6.06E-02	5.71E-02		
S448	Inter Pipeline Propylene Ltd.	PDH	No 3 Interheater	359556	5961056	634	74.0	1.80	4.70	448	5.78E-01	5.27E-02	4.97E-02		
S449	Inter Pipeline Propylene Ltd.	PDH	Vent Stack	359540	5961050	634	78.6	0.40	7.20	342	0.00E+00	0.00E+00	0.00E+00		
S450	Inter Pipeline Propylene Ltd.	PDH	Flare Stack	359631	5960728	632	124.0	48.80	0.00	934	9.04E-03	4.92E-02	3.59E-03		
S451	Inter Pipeline Propylene Ltd.	PP	Incinerator	359345	5960779	633	23.7	1.95	6.00	1033	2.62E+00	1.10E-01	2.62E-01		Vertical
S452	Inter Pipeline Propylene Ltd.	PP	LSB Air Handling Unit	359626	5961407	634	12.2	0.30	7.50	333	3.08E-02	2.59E-02	0.00E+00		Vertical
S453	Inter Pipeline Propylene Ltd.	PP	LSB Unit Heater 1	359625	5961396	634	7.0	0.10	7.50	333	1.64E-03	1.38E-03	2.49E-05		Horizontal
S454	Inter Pipeline Propylene Ltd.	PP	LSB Unit Heater 2	359610	5961388	634	7.0	0.10	7.50	333	1.64E-03	1.38E-03	2.49E-05		Horizontal
S455	Inter Pipeline Propylene Ltd.	PP	LSB Unit Heater 3	359599	5961392	634	7.0	0.10	7.50	333	1.64E-03	1.38E-03	2.49E-05		Horizontal
S456	Inter Pipeline Propylene Ltd.	PP	LSB Unit Heater 4	359601	5961403	634	7.0	0.10	7.50	333	1.64E-03	1.38E-03	2.49E-05		Horizontal
S457	Inter Pipeline Propylene Ltd.	PP	LSB Unit Heater 5	359617	5961411	634	7.0	0.10	7.50	333	1.64E-03	1.38E-03	2.49E-05		Horizontal
S458	Inter Pipeline Propylene Ltd.	PP	Railcar Rinse Water Heater	359276	5960870	633	23.4	0.61	15.00	473	1.38E-01	1.62E-01	1.04E-03		Vertical
S459	Inter Pipeline Propylene Ltd.	PP	Railcar Recycle Wash Water Heater	359277	5960889	634	24.0	0.61	15.00	473	1.38E-01	1.62E-01	1.04E-03		Vertical
S460	Inter Pipeline Propylene Ltd.	PP	Hot Glycol Heater	359334	5960756	632	9.1	0.56	20.00	437	1.28E-01	1.00E+00	5.15E-03		Vertical
S461	Inter Pipeline Propylene Ltd.	PP	PP storage Building Heater 1	359394	5960857	633	5.7	0.13	7.50	333	2.40E-03	2.01E-03	3.62E-05		Horizontal
S462	Inter Pipeline Propylene Ltd.	PP	PP storage Building Heater 2	359372	5960844	633	5.7	0.13	7.50	333	2.40E-03	2.01E-03	3.62E-05		Horizontal
S463	Inter Pipeline Propylene Ltd.	PP	PP storage Building Heater 3	359379	5960813	633	5.7	0.13	7.50	333	2.40E-03	2.01E-03	3.62E-05		Horizontal
S464	Inter Pipeline Propylene Ltd.	PP	PP storage Building Heater 4	359390	5960812	633	5.7	0.13	7.50	333	2.40E-03	2.01E-03	3.62E-05		Horizontal
S465	Inter Pipeline Propylene Ltd.	PP	PP storage Building Heater 5	359393	5960824	633	5.7	0.13	7.50	333	2.40E-03	2.01E-03	3.62E-05		Horizontal
S466	Inter Pipeline Propylene Ltd.	PP	PP storage Building Air Handling Unit	359380	5960989	634	9.2	0.30	7.50	333	8.18E-03	6.88E-03	1.24E-04		Vertical
S467	Inter Pipeline Propylene Ltd.	PP	Peroxide Storage Building Heater	359367	5960856	633	5.6	0.25	7.50	333	2.38E-03	2.00E-03	3.60E-05		Vertical
S468	Inter Pipeline Propylene Ltd.	PP	PP Storage Office Building Heater	359359	5960829	633	5.7	0.25	7.50	333	1.64E-03	1.38E-03	2.49E-05		Vertical
S469	Inter Pipeline Propylene Ltd.	PP	Additive System Vents	359373	5960924	634	36.0	0.76	36.70	303	0.00E+00	0.00E+00	3.33E-04		Vertical
S470	Inter Pipeline Propylene Ltd.	PP	Pellet Dryer Exhaust Fan Vent	359365	5960924	634	25.5	37.40	17.10	333	0.00E+00	0.00E+00	7.11E-03		Vertical
S471	Inter Pipeline Propylene Ltd.	PP	Dedusting System Exhaust Air Filter Vent	359309	5960892	634	20.3	0.20	14.70	303	0.00E+00	0.00E+00	8.33E-03		Horizontal
S472	Inter Pipeline Propylene Ltd.	PP	Flare	359397	5961151	634	41.1	3.32	0.01	899	1.86E-03	8.47E-03	3.28E-03		Vertical
S473	Hexion Specialty Chemicals Canada Inc.	Hexion Sturgeon	Thermal Oxidizer	352575	5957482	646	27.7	1.68	7.20	867	2.66E+00	2.25E+00	4.44E-01		
S474	Air Liquide Canada Inc.	Scotford Cogeneration Plant	Auxiliary Boiler Exhaust Stack	362952	5963270	624	22.9	1.80	24.10	468	6.97E-01	1.14E+00	3.20E-02		
S475	Air Liquide Canada Inc.	Scotford Cogeneration Plant	Gas Turbine/HRSG Exhaust Stack	362942	5963258	624	32.3	5.60	16.60	438	1.75E+01	3.24E+00	1.99E-01		
S476	Gasia Energy Partners Ltd.	Gasia Homestead Diluent Recovery Unit	Charge Heater	368620	5962086	631	48.2	1.70	7.90	519	5.50E-01	0.00E+00	8.50E-02		

Source ID	Operator	Facility	Source Description	Stack parameters							Emission Rate			Rain Cap	Non-Vertical
				UTM E (m)	UTM N (m)	Base Elevation (m)	H (m)	D (m)	V (m/s)	T (K)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)		
S477	Gasia Energy Partners Ltd.	Gasia Homestead Diluent Recovery Unit	Hot Oil Heater	368595	5962072	631	9.5	0.61	7.90	523	1.50E-01	0.00E+00	3.10E-02		
S478	Gasia Energy Partners Ltd.	Gasia Homestead Diluent Recovery Unit	Boiler	368607	5962054	631	10.0	0.61	7.90	523	6.00E-02	0.00E+00	1.20E-02		
S479	Sulphur Midstream Ltd	Strathcona Sulphur forming and Shipping Facility	Steam Boiler	368529	5962159	630	15.9	0.50	10.00	473	1.55E-01	1.30E-01	2.34E-03		
S480	Sulphur Midstream Ltd	Strathcona Sulphur forming and Shipping Facility	Steam Boiler	368600	5962204	630	15.9	0.50	10.00	473	5.07E-02	4.26E-02	7.66E-04		
S481	Heartland Sulphur Ltd	Heartland Sulphur Terminal	Steam Generator 1	365611	5960794	632	12.2	0.50	10.00	473	1.55E-01	1.30E-01	2.34E-03		
S482	Heartland Sulphur Ltd	Heartland Sulphur Terminal	Steam Generator 2	365621	5960794	632	9.8	0.50	10.00	473	5.07E-02	4.26E-02	7.66E-04		
S483	Heartland Sulphur Ltd	Heartland Sulphur Terminal	Re-melt Boiler Exhaust 1	365631	5960794	632	7.6	0.50	10.00	473	1.70E-02	1.43E-02	2.56E-04		
S484	Heartland Sulphur Ltd	Heartland Sulphur Terminal	Re-melt Boiler Exhaust 2	365641	5960794	632	7.6	0.50	10.00	473	1.70E-02	1.43E-02	2.56E-04		
S485	Wolf Midstream	NGL Recovery Facility	Heater	360532	5966262	631	9.5	0.80	3.80	452	4.97E-02	6.78E-02	6.14E-03		
S177	Access Pipeline Inc./Wolf Midstream	Stonefell Terminal	Heater	365012	5965499	625	7.5	0.50	10.00	473	0.00E+00	0.00E+00	0.00E+00		
S486	Mancal Energy Inc	MANCAL REDWATER 2-12-56-21W4	Heater	369211	5965265	622	7.5	0.50	10.00	473	4.79E-02	9.32E-02	9.89E-03		
S487	Mancal Energy Inc	MEI BRUDERHEIM PROR BTTY 14-28-55-20	Heater	373515	5961393	657	7.5	0.50	10.00	473	1.08E-02	5.05E-02	1.72E-02		
S488	Longshore Resources Ltd	Shaker 15-24-55-21W4 Oil Battery	Heater	369079	5959964	655	7.5	0.50	10.00	473	1.73E-01	3.61E-01	5.14E-02		
S489	543077 Alberta Ltd	Sil Industrial Minerals Lamont Plant	Heater	373689	5974793	610	7.5	0.50	10.00	473	4.14E-01	1.41E-01	2.66E-03		
S490	Long Run Exploration Ltd.	Redwater 07-21	Compressor	355066	5979093	656	10.0	0.50	30.00	773	3.36E-01	5.13E-01	1.80E-03		
S491	Long Run Exploration Ltd.	Ramparts GGS 05-17	Heater	362329	5977388	632	7.5	0.50	10.00	473	1.67E+00	2.58E+00	6.98E-03		

Notes:
H – Stack Height
D – Stack Diameter
V – Exit Velocity
T – Exhaust Temperature

Table A.2 Regional Volume Sources and Emission Parameters

Source ID	Operator	Facility	Source Description	Stack parameters						Emission Rate		
				UTM Easting (m)	UTM Northing (m)	Base Elevation (m)	Effective Height (m)	Initial σy (m)	Initial σz (m)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)
NP1	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Plant 32 Cooling Tower	362729	5967969	620	18.9	20.40	4.65	0.00E+00	0.00E+00	3.30E-03
NP2	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Plant 36 Cooling Tower	362449	5967674	625	18.9	15.90	8.80	0.00E+00	0.00E+00	4.47E-03
NP4	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Sulphuric Acid Cooling Tower	362605	5968463	628	18.0	23.20	8.40	0.00E+00	0.00E+00	4.50E-04
NP5	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Utilities Unit Cooling Towers	355653	5954872	623	22.0	20.81	9.30	0.00E+00	0.00E+00	3.75E-07
NP7	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Cobalt Separation and Reduction Unit	355647	5954688	623	14.0	10.98	6.52	6.71E-02	1.34E-02	5.13E-06
NP14	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	LHC-1 Cooling Towers	359169	5957952	632	19.9	29.42	8.37	0.00E+00	0.00E+00	1.37E-03
NP15	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	ES Cooling Towers	356282	5956513	623	18.0	18.26	7.44	0.00E+00	0.00E+00	5.35E-04
NP16	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	MEGlobal Cooling Towers	357124	5956631	624	19.8	4.88	8.37	0.00E+00	0.00E+00	9.68E-05
NP27	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Cooling Towers	355319	5955219	618	13.7	1.86	6.37	0.00E+00	0.00E+00	4.00E-03
NP29	North West Redwater Holding Corp	Sturgeon Oil Refinery	Cooling Tower (PM)	360668	5968355	634	16.8	9.07	7.81	0.00E+00	0.00E+00	1.47E-04
NP35	Air Liquide Canada Inc.	Air Liquide Scotford Complex	Duct Burners	362715	5963135	624	32.3	1.16	15.02	8.45E-01	7.10E-01	1.61E-02

Table A.3 Regional Area Sources and Emission Parameters

Source ID	Operator	Facility	Source Description	Stack parameters		Emission Rate		
				Effective Height (m)	Initial σz (m)	NO_X (g/s)	CO (g/s)	$PM_{2.5}$ (g/s)
NP1	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Miscellaneous Stationary Propane Combustion	5.0	2.30	1.74E-02	1.01E-02	2.68E-04
NP2	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Ammonium Sulphate Unit	15.3	7.10	0.00E+00	0.00E+00	5.24E-03
NP3	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Nickel Intermediate Dry Stack	3.5	1.00	0.00E+00	0.00E+00	1.34E-04
NP4	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Cobalt Sintering & Storage	7.5	3.49	1.47E-01	2.94E-02	4.41E-03
NP5	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Maintenance Shop	8.0	3.72	4.48E-02	8.95E-03	1.34E-03
NP6	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Granulation Unit	19.2	8.93	0.00E+00	0.00E+00	7.00E-03
NP7	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Nickel Reduction Unit	21.2	9.87	0.00E+00	0.00E+00	2.01E-03
NP8	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Leach Unit Feed Shed Heaters	5.0	2.33	1.80E-02	1.94E-02	7.36E-05
NP9	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Site Building Heaters	5.0	2.33	5.45E-02	2.32E-02	1.10E-03
NP10	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Site Building Heaters	5.0	2.33	5.45E-02	2.32E-02	1.10E-03
NP11	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Site Propane Heaters	1.5	1.40	6.52E-03	3.76E-03	1.00E-04
NP12	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Site Propane Heaters	1.5	1.40	6.52E-03	3.76E-03	1.00E-04
NP13	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Various Space Heating and Ventilation Exhausts	5.0	2.33	6.66E-03	8.56E-03	3.17E-05
NP14	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	Various Heating and Ventilation Exhausts	5.0	2.33	4.76E-03	4.12E-03	1.27E-05
NP15	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Seed Bin Vents (5)	12.7	5.67	0.00E+00	0.00E+00	2.98E-04
NP16	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Meal Bin Vents (3)	15.1	6.80	0.00E+00	0.00E+00	1.34E-02
NP17	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Pellet Bin Vents (2)	15.1	6.80	0.00E+00	0.00E+00	3.43E-03
NP18	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant and Associated Brine Storage Ponds	Space Heater Exhaust Vents	5.0	2.33	7.13E-04	4.12E-04	1.10E-05
NP19	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Stationary Propane Users	5.0	2.33	6.02E-03	3.49E-03	9.26E-05
NP20	Pembina Marketing Ltd.	Canadian Diluent Hub Bulk Petroleum Storage Terminal	Space Heater Exhaust Vents	6.3	2.92	4.25E-02	6.68E-02	6.04E-03
NP21	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility and Brine Storage Ponds	Space Heater Exhaust Vents	5.0	2.33	3.75E-02	3.12E-02	1.00E-03
NP22	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Combined Heating	5.0	2.33	2.40E-02	2.01E-02	4.44E-04
NP23	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Infrared Dryers	5.0	2.33	0.00E+00	0.00E+00	2.35E-03
NP24	Conifer Energy Inc.	Redwater Gas Conservation Plant	Space Heater Exhaust Vents	10.0	4.65	3.75E-02	3.12E-02	1.00E-03
NP25	Air Liquide Canada Inc.	Air Liquide Scotford Complex	Miscellaneous Heaters	5.0	2.33	1.02E+00	8.59E-01	1.94E-02
NP26	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Propane Combustion	5.0	2.33	2.29E-04	1.37E-04	2.97E-06
NP27	Secure Energy Services Inc.	Redwater Hazardous Waste and Recyclables Storage and Processing Facility	Space Heater Exhaust Stacks	5.0	2.33	9.51E-02	4.12E-02	3.17E-04

Table A.4 Regional Area Sources Locations

Source ID	Operator	Facility	Source Description	Corner 1		Corner 2		Corner 3		Corner 4		Corner 5		Corner 6		Corner 7		Corner 8		Base Elevation (m)
				UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	
NP1	Nutrien (Canada) Holdings ULC	Redwater Fertilizer Manufacturing Plant	Miscellaneous Stationary Propane Combustion	362045	5968431	362916	5968415	362508	5967567	361980	5967587	-	-	-	-	-	-	-	-	632
NP2	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Ammonium Sulphate Unit	355530	5954596	355555	5954631	355573	5954618	355551	5954583	-	-	-	-	-	-	-	-	623
NP3	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Nickel Intermediate Dry Stack	355811	5955436	355823	5955493	355880	5955469	355868	5955451	355852	5955405	355842	5955393	355830	5955398	-	-	630
NP4	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Cobalt Sintering & Storage	355264	5954721	355309	5954793	355327	5954782	355333	5954792	355392	5954746	355382	5954730	355394	5954703	355363	5954659	621
NP5	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Maintenance Shop	355482	5954967	355500	5954995	355624	5954927	355604	5954894	-	-	-	-	-	-	-	-	621
NP6	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Granulation Unit	355738	5954495	355745	5954507	355756	5954501	355762	5954511	355774	5954504	355754	5954470	355742	5954477	355749	5954489	623
NP7	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Nickel Reduction Unit	355672	5954622	355682	5954639	355698	5954630	355706	5954643	355700	5954647	355705	5954655	355747	5954631	355724	5954590	623
NP8	Sherritt International Corporation	Fort Saskatchewan Metal Manufacturing Plant	Leach Unit Feed Shed Heaters	355698	5954826	355889	5954734	355825	5954635	355646	5954728	-	-	-	-	-	-	-	-	623
NP9	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Site Building Heaters	356040	5956612	356954	5957149	357658	5955865	356740	5955337	-	-	-	-	-	-	-	-	609
NP10	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Site Building Heaters	358412	5957203	358479	5958486	359434	5958459	359369	5957158	-	-	-	-	-	-	-	-	630
NP11	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Site Propane Heaters	356040	5956612	356954	5957149	357658	5955865	356740	5955337	-	-	-	-	-	-	-	-	609
NP12	Dow Chemical Canada ULC	Fort Saskatchewan Chemical Manufacturing Plant	Site Propane Heaters	358412	5957203	358479	5958486	359434	5958459	359369	5957158	-	-	-	-	-	-	-	-	630
NP13	Chemtrade West Ltd. Partnership	Fort Saskatchewan Sulphides	Various Space Heating and Ventilation Exhausts	356280	5954515	356462	5954650	356488	5954641	356493	5954448	356373	5954452	-	-	-	-	-	-	624
NP14	Chemtrade West Ltd. Partnership	Fort Saskatchewan Chemical Manufacturing Plant	Various Heating and Ventilation Exhausts	355966	5954642	356069	5954761	356143	5954685	356048	5954570	-	-	-	-	-	-	-	-	624
NP15	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Seed Bin Vents (5)	352462	5955665	352483	5955692	352525	5955671	352483	5955631	-	-	-	-	-	-	-	-	642
NP16	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Meal Bin Vents (3)	352497	5955576	352507	5955584	352527	5955550	352505	5955533	352497	5955541	352512	5955558	-	-	-	-	641
NP17	Bunge Canada	Fort Saskatchewan Oil Seed Processing Plant	Pellet Bin Vents (2)	352494	5955572	352508	5955562	352491	5955545	352479	5955552	-	-	-	-	-	-	-	-	641
NP18	Plains Midstream Canada ULC	Fort Saskatchewan Fractionation Plant and Associated Brine Storage Ponds	Space Heater Exhaust Vents	357476	5959134	357887	5959107	358026	5958467	357790	5958187	355700	5954647	355705	5954655	-	-	-	-	621
NP19	Nutrien (Canada) Holdings ULC	Fort Saskatchewan Fertilizer Manufacturing Plant	Stationary Propane Users	355099	5955353	355490	5955434	355531	5955071	355155	5955016	-	-	-	-	-	-	-	-	611

Source ID	Operator	Facility	Source Description	Corner 1		Corner 2		Corner 3		Corner 4		Corner 5		Corner 6		Corner 7		Corner 8		Base Elevation (m)
				UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	UTM E (m)	UTM N (m)	
NP20	Pembina Marketing Ltd.	Canadian Diluent Hub Bulk Petroleum Storage Terminal	Space Heater Exhaust Vents	362671	5961135	363119	5961126	363115	5960677	362661	5960687	-	-	-	-	-	-	-	-	628
NP21	Keyera Energy Ltd.	Fort Saskatchewan Fractionation Facility and Brine Storage Ponds	Space Heater Exhaust Vents	356946	5958152	358291	5958079	358274	5957425	358227	5957347	358092	5957285	357063	5957341	356783	5957673	356906	5957904	620
NP22	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Combined Heating	355188	5954742	355339	5954888	355561	5954764	355430	5954592	-	-	-	-	-	-	-	-	619
NP23	Oerlikon Metco (Canada) Inc.	Fort Saskatchewan Metal Manufacturing Plant	Infrared Dryers	355188	5954742	355339	5954888	355561	5954764	355430	5954592	-	-	-	-	-	-	-	-	619
NP24	Conifer Energy Inc.	Redwater Gas Conservation Plant	Space Heater Exhaust Vents	363487	5980394	363477	5980105	363723	5980096	363738	5980392	-	-	-	-	-	-	-	-	616
NP25	Air Liquide Canada Inc.	Air Liquide Scotford Complex	Miscellaneous Heaters	362697	5963147	362734	5963146	362733	5963123	362696	5963124	-	-	-	-	-	-	-	-	624
NP26	Umicore (Canada) Inc.	Fort Saskatchewan Metals and Chemical Manufacturing Plant	Propane Combustion	355487	5954791	355546	5954758	355512	5954695	355455	5954730	355700	5954647	355705	5954655	-	-	-	-	622
NP27	Secure Energy Services Inc.	Redwater Hazardous Waste and Recyclables Storage and Processing Facility	Space Heater Exhaust Stacks	362627	5980290	363028	5980278	363017	5979876	362616	5979888	-	-	-	-	-	-	-	-	625

Appendix B Climate and Meteorology in the Study Area

B.1 Introduction

Stantec has analyzed the meteorological data that were developed and used in the Air Quality Assessment for the Greenlight Electricity Centre (the Project). Five years of meteorological data from January 1, 2015, to December 31, 2019, were used in the dispersion modelling study which was outlined in the main report. The AEP extraction utility software Multi-modal Extraction Utility 2 (MMEU2) was used to extract the site-specific surface and upper air meteorological data from the 2015-2019 WRF 4-km grid meteorological data provided by Alberta Environment and Parks (AEP 2021a).

The AERMOD meteorological pre-processor AERMET (most recent v24142) was used to process the meteorological dataset used in dispersion modelling (U.S. EPA 2024). The MMEU2 provides a formatted standardized Solar and Meteorological Surface Observation Network (SAMSON) surface station file and a Radiosonde Observation (RAOBS) upper air station file that are readable by the AERMOD modelling system meteorological model AERMET (U.S. EPA, 2024).

AERMET is used to estimate two stability parameters, friction velocity and Monin-Obukhov length, to characterize the amount of turbulence in the atmosphere. The friction velocity is a measure of mechanical effects alone, such as wind shear at ground-level. The Monin-Obukhov length indicates the relative strengths of mechanical and buoyancy effects on atmospheric turbulence. Thus, AERMOD can account for turbulence both from wind shear, and from buoyancy effects due to solar heating during the day and radiational cooling at night. To properly account for these effects, AERMET requires three land use parameters: albedo, Bowen ratio, and surface roughness. Albedo is defined as the fraction of total incident solar radiation reflected by a particular surface without absorption. Bowen ratio is an indicator of surface moisture conditions and can be defined as the ratio of the sensible heat flux to the latent heat flux. Surface roughness is a length scale that characterizes the roughness of the earth’s surface.

B.2 Surface Characteristics

For this assessment, the 2015 Land Use Cover of Canada (NRCan, 2020) was used to determine land use categories within the 3km of the Project. The 2015 Land Cover of Canada data was extracted by AEP MMEU2. Site-specific values for albedo, Bowen ratio, and surface roughness were selected based on land use within 3 km of the Project and on the Air Quality Model Guideline (AQMG; (AEP 2021b). Considering the surface characteristics surrounding the Project, four wind direction sectors were used in the AERMET stage 2 run. Selected land type surface parameters are presented in Table B.1. The values of each parameter were based on AQMG Appendix E (AEP 2021b) and varied as a function of month of year to account for the changing surface characteristics of the growing seasons and snow cover.

Table B.1 Surface Parameters Applied in AERMET Processing (Wind Direction 0 to 360)

Month	Albedo	Bowen Ratio	Surface Roughness (m)
January	0.600	0.500	0.014
February	0.600	0.500	0.014
March	0.600	0.500	0.014
April	0.140	0.300	0.040
May	0.140	0.300	0.040
June	0.200	0.500	0.200
July	0.200	0.500	0.200
August	0.200	0.500	0.200
September	0.200	0.700	0.200
October	0.200	0.700	0.200
November	0.600	0.500	0.014
December	0.600	0.500	0.014

Note:

Sector of wind direction 0 to 360degrees use values of agricultural land

B.3 Meteorology In The Study Area

The meteorological data used to run AERMOD (as output from AERMET) can be summarized in terms of its major parameters: ambient temperature, wind speed and direction, atmospheric stability, and mixing height. The following sections discuss these parameters and present the results of analyses performed on the meteorological dataset.

B.3.1 Ambient Temperature

Average and median surface temperatures extracted at the project site for January 1, 2015, to December 31, 2019, are provided in Table B.2. Extreme minimum and maximum temperatures for the five-year period were -38.8 and 31.0 °C, respectively.

Table B.2 Average and Median Surface Temperatures for the Project Site Based on AERMET Data from January 1, 2015 to December 31, 2019

Season	Air Temperature (°C)	
	Average	Median
Winter	-9.4	-8.3
Spring	7.1	7.1
Summer	15.9	15.7
Autumn	5.6	5.0

Note:

[a] Winter: November, December, January, February and March. Spring: April, and May. Summer: June, July, and August. Autumn: September and October.

B.3.2 Winds

Figure B.1 shows the frequency distributions of hourly average wind speed based on the meteorological dataset applied in dispersion modelling from January 1, 2015, to December 31, 2019. For 65.3% of the time, wind speeds were less than 4.0 m/s.

Wind roses are an efficient and convenient means of presenting wind data. The length of the radial barbs gives the total percent frequency of winds from the indicated direction, while portions of the barbs of different widths indicate the frequency of associated wind speed categories. Figure B.2 presents the annual wind rose. Winds are mainly from west, southwest, and northwest.

Figure B.1 Frequency Distribution of Hourly Average Wind Speed for the Project Site Based on AERMET Data from January 1, 2015 to December 31, 2019

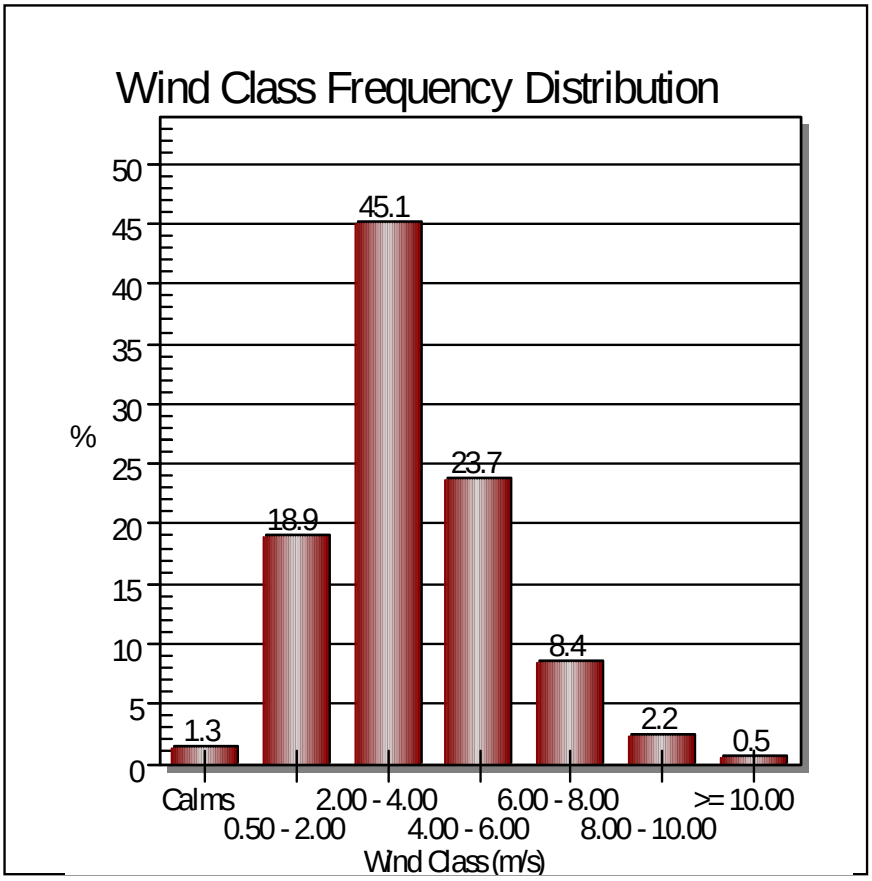
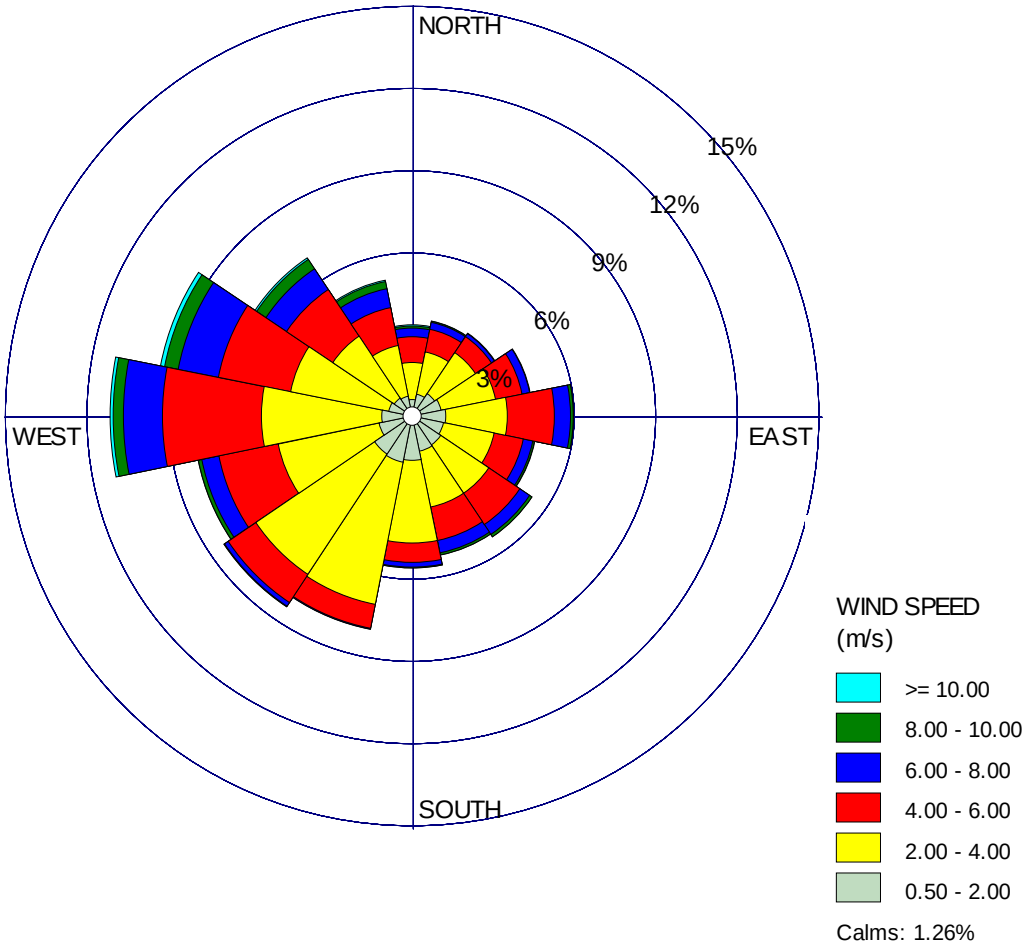


Figure B.2 Annual Wind Rose of Hourly Average Wind Speed and Direction for the Site Based on AERMET Data from January 1, 2015 to December 31, 2019

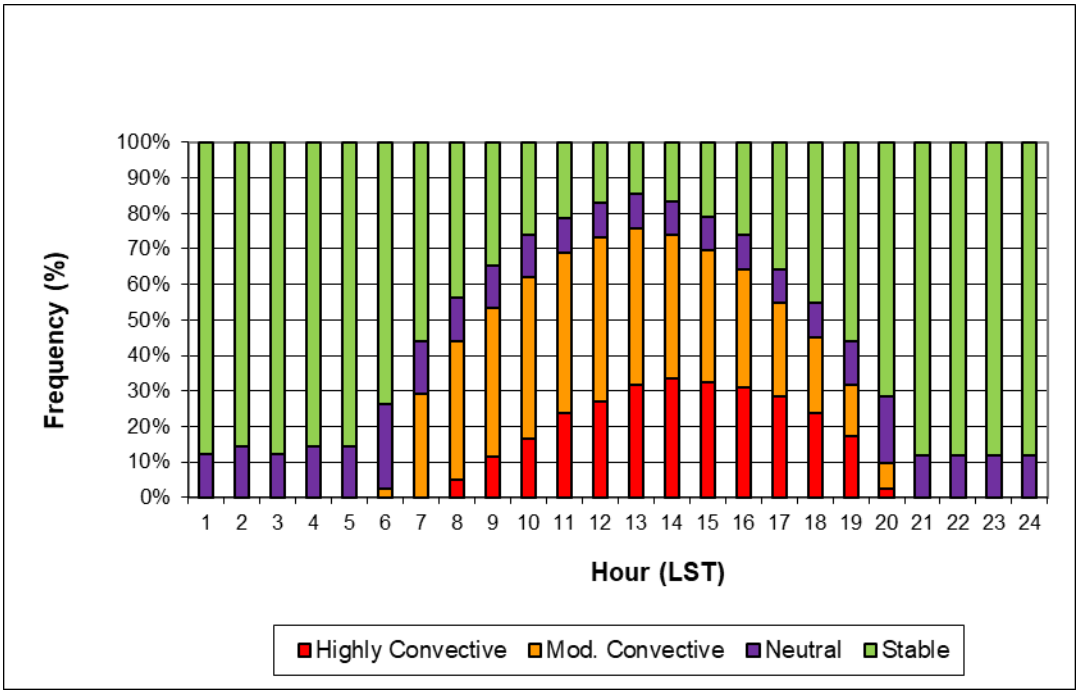


B.3.3 Atmospheric Stability

Atmospheric turbulence near the earth's surface is a function of atmospheric stability, which is governed by thermal and mechanical influences. The atmosphere can be broadly described as being stable, neutral, or unstable. During night-time hours, the earth's surface emits thermal radiation and cools. Air in contact with the ground thus becomes cooler and denser than the air aloft. This phenomenon is referred to as a ground-based temperature inversion. Vertical motions of the atmosphere are suppressed, and the atmosphere is described as stable. This contrasts with daytime situations when the sun heats the ground. Air in contact with the ground becomes warmer and less dense than the air aloft. Vertical motions of the atmosphere are enhanced, and the atmosphere is said to be unstable. When a balance exists between incoming and outgoing radiation, there is no net heating or cooling of the air in contact with the ground and vertical motions of the atmosphere are neither enhanced nor suppressed. Such an atmosphere is described as neutral and exists during overcast skies or in transition from unstable to stable conditions. Mechanical mixing may also create neutral atmospheres generated by strong winds.

Figure B.3 presents the frequency distribution of atmospheric stability with time of day for meteorological data applied in dispersion modelling. Generally, highly and moderately unstable conditions are dominant from early morning (approximately 09:00) to early evening (approximately 17:00) while neutral and stable conditions occur most often during night-time.

Figure B.3 Frequency Distribution of Atmospheric Stability with Time of Day for the Project Site Based on AERMET Data from January 1, 2015 to December 31, 2019



B.3.4 Mixing Height

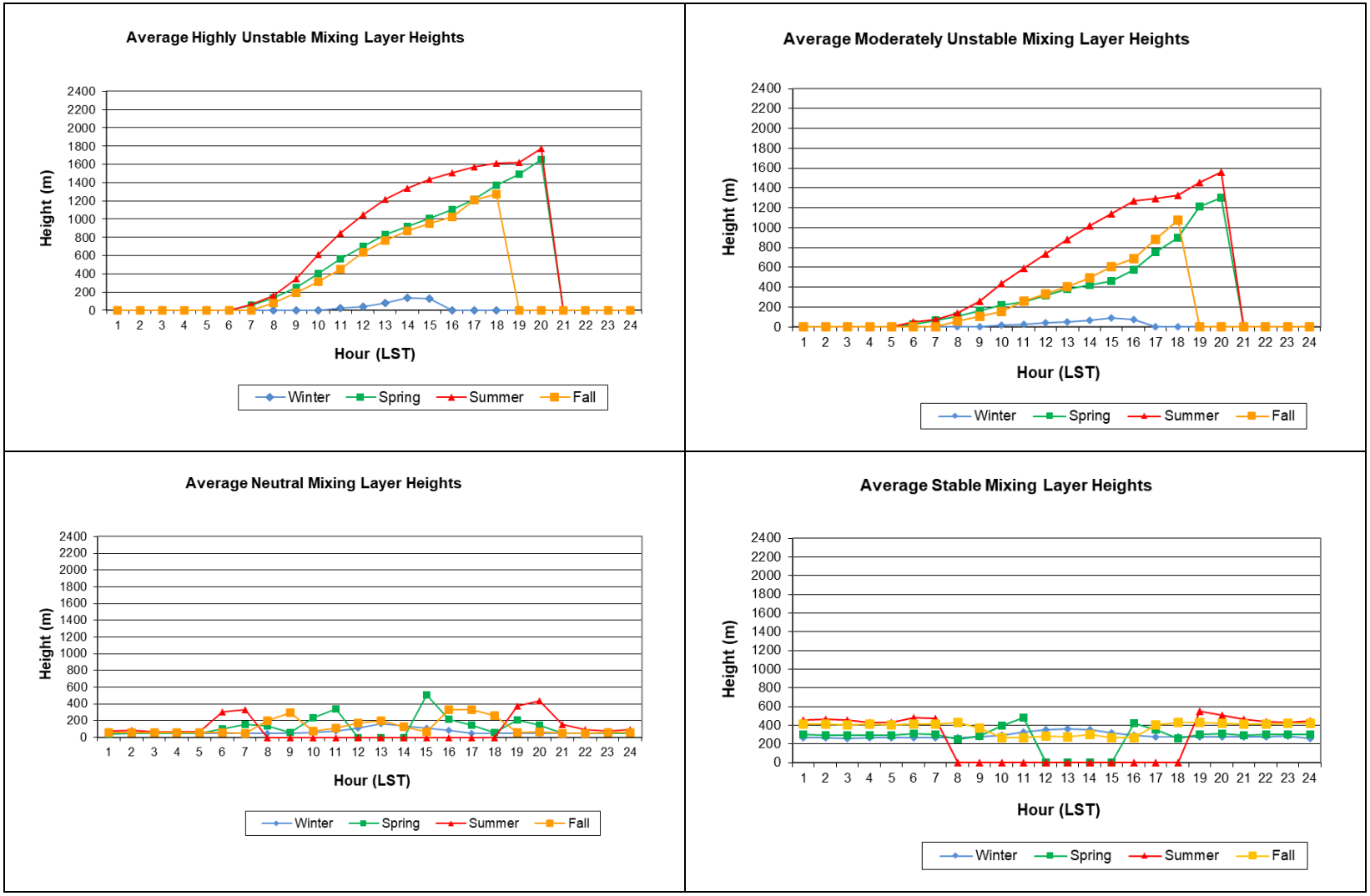
Strong solar heating or strong winds can create a two-layered atmosphere. The lower layer is well mixed and characterized by either neutral or unstable conditions; the upper layer is characterized by stable conditions (elevated temperature inversion). Vertical motions in the upper layer are damped, which effectively prevents the transfer of air between the two layers. The depth of this lower atmospheric boundary layer is defined as the mixing height. Thus, emissions injected into the mixing layer may become trapped if they do not have enough buoyancy or momentum to penetrate the elevated stable layer. This leads to the classical trapping situation that is often associated with poor air quality.

Mechanical interactions result in mixing of air by roughness at the surface of the earth. Surface roughness can be due to topography, forests, or buildings. Heights of the mechanically mixed layer are location dependent and proportional to wind speed.

Atmospheric thermal interactions are caused by the effects of solar radiation. During the day, unstable conditions are created by radiation from the sun. This creates warmer, less dense air that rises, while cooler, more dense air from above sinks to ground level. As air rises, it expands and cools. Upward motion ceases at the height where rising air reaches the same temperature as surrounding air. This height is called the convective mixing height. It is dependent on the intensity of solar radiation and vertical temperature characteristics of the air mass.

The hourly distribution of average mixing layer height for highly unstable, moderately unstable, neutral, and stable atmospheric conditions for meteorological data applied in dispersion modelling are presented in Figure B.4. Mixing heights vary from several tens of metres to several thousands of metres, depending on the intensity of solar radiation reaching the earth’s surface and wind speed. Mixing heights are much greater during the spring and summer than the winter. Maximum mixing heights usually occur during late afternoon hours when the effects of solar heating are greatest, while minimum heights occur at night.

Figure B.4 Hourly Distribution of Average Mixing Layer Heights for Highly Unstable, Moderate Unstable, Neutral, and Stable Conditions by Season for the Project Site Based on AERMET Data from January 1, 2015 to December 31, 2019



B.4 References

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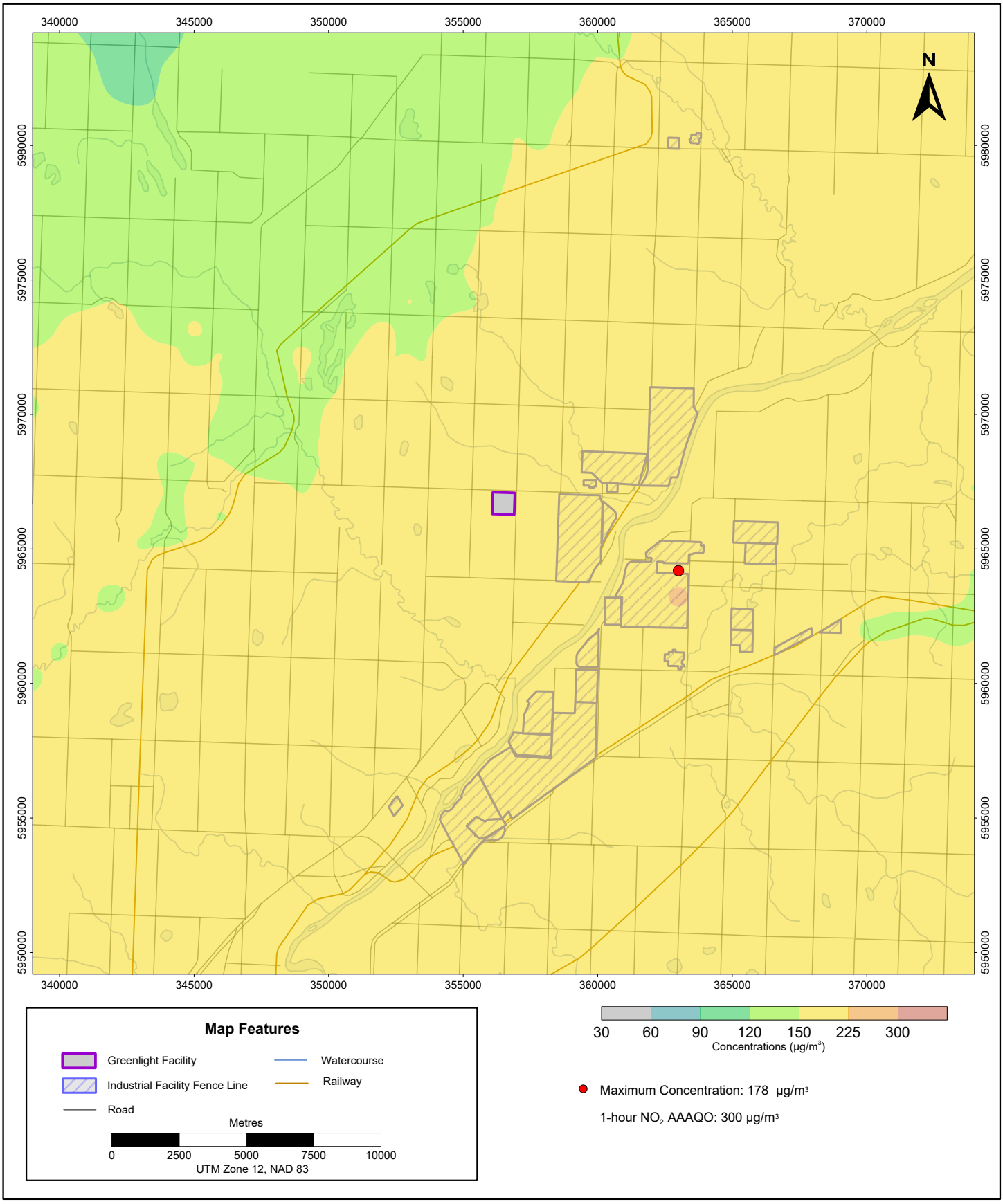
Appendix C Isopleths of Maximum Predicted Concentrations



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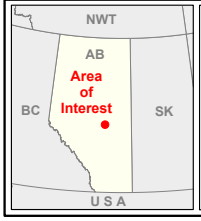

Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 1-hour NO_2 (ARM2) Concentrations (Base Case)

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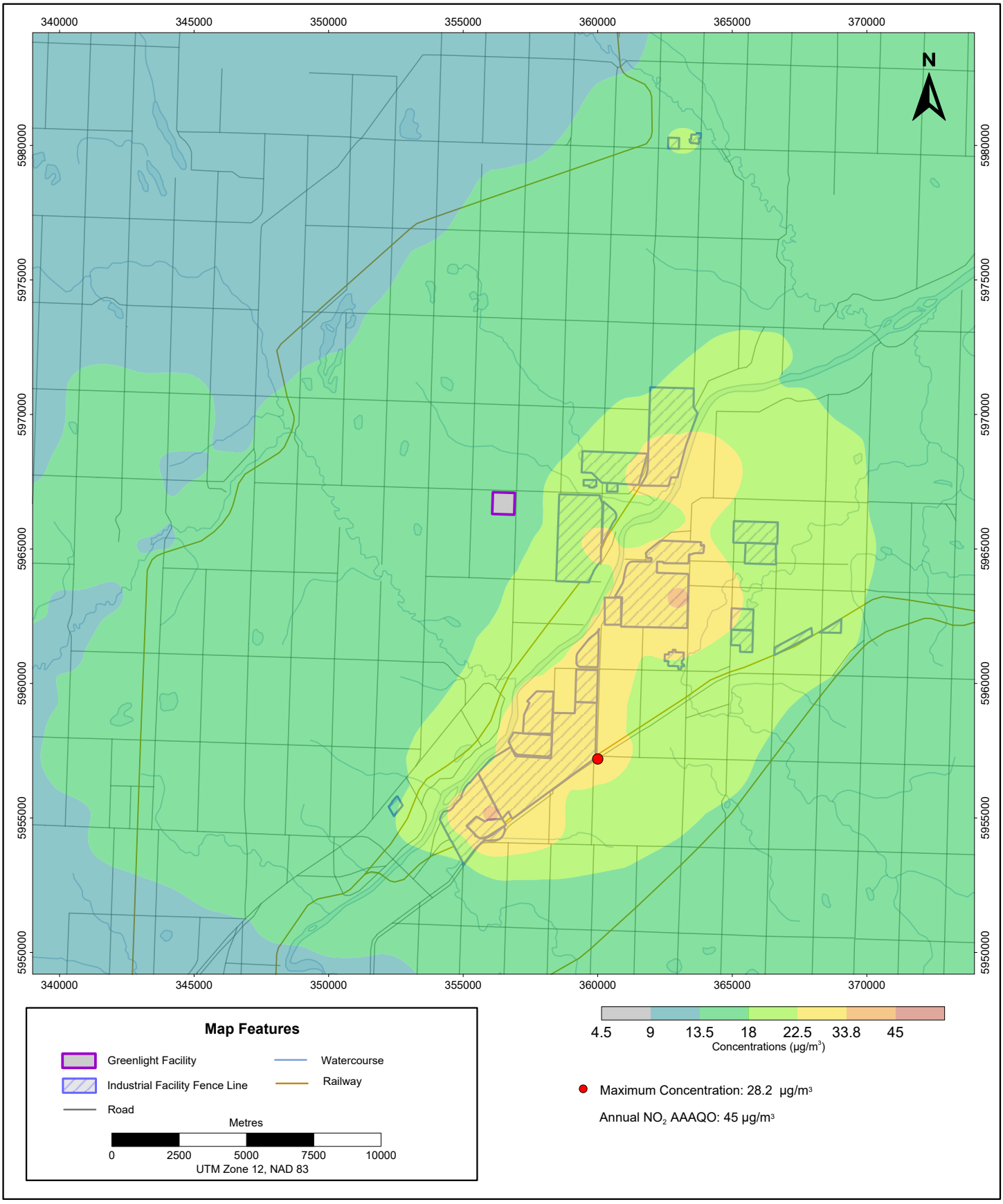
FIGURE NO.
C.1



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Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted Annual NO_2 (ARM2) Concentrations (Base Case)

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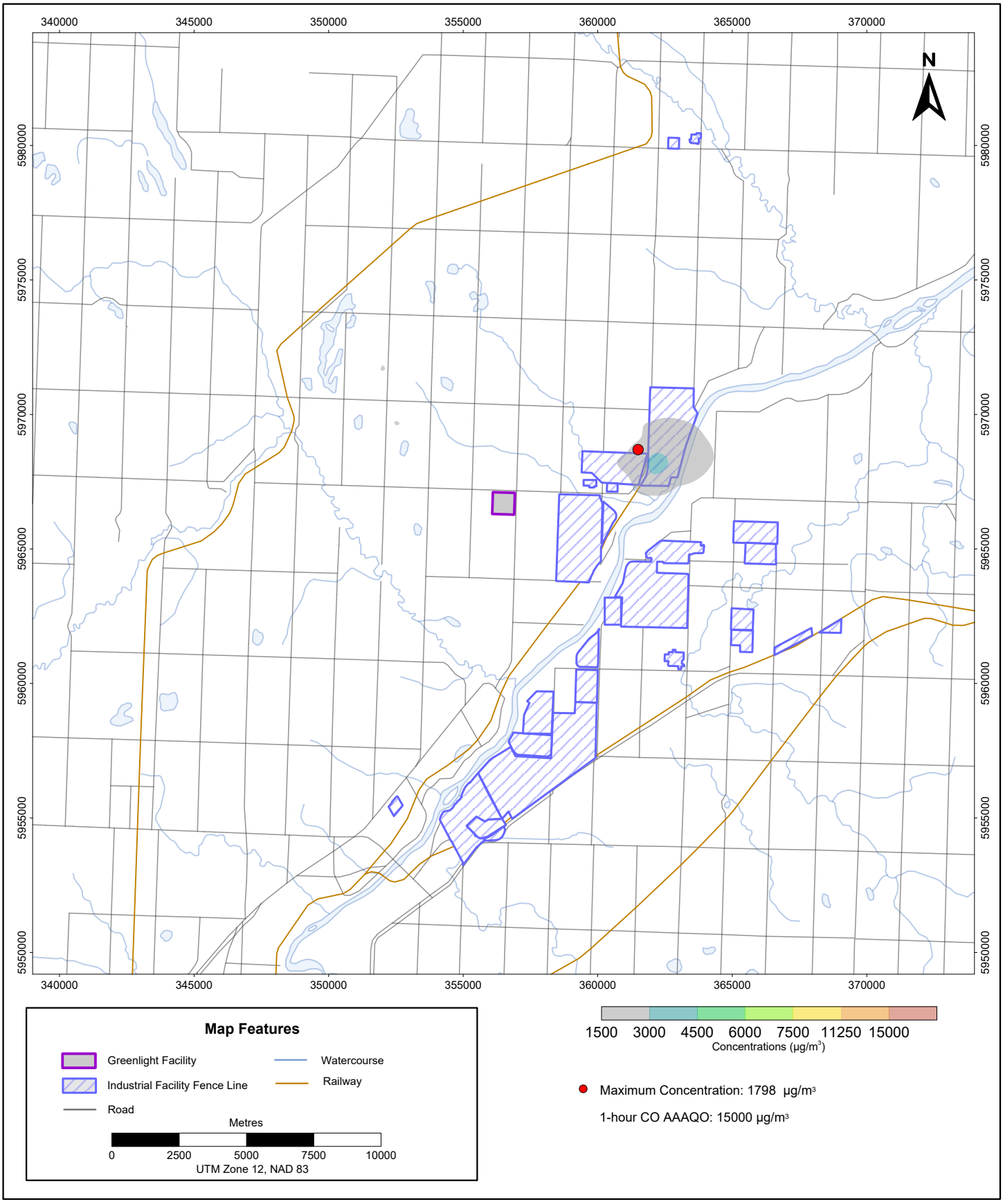
FIGURE NO.
C.2



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Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 1-hour CO Concentrations (Base Case)

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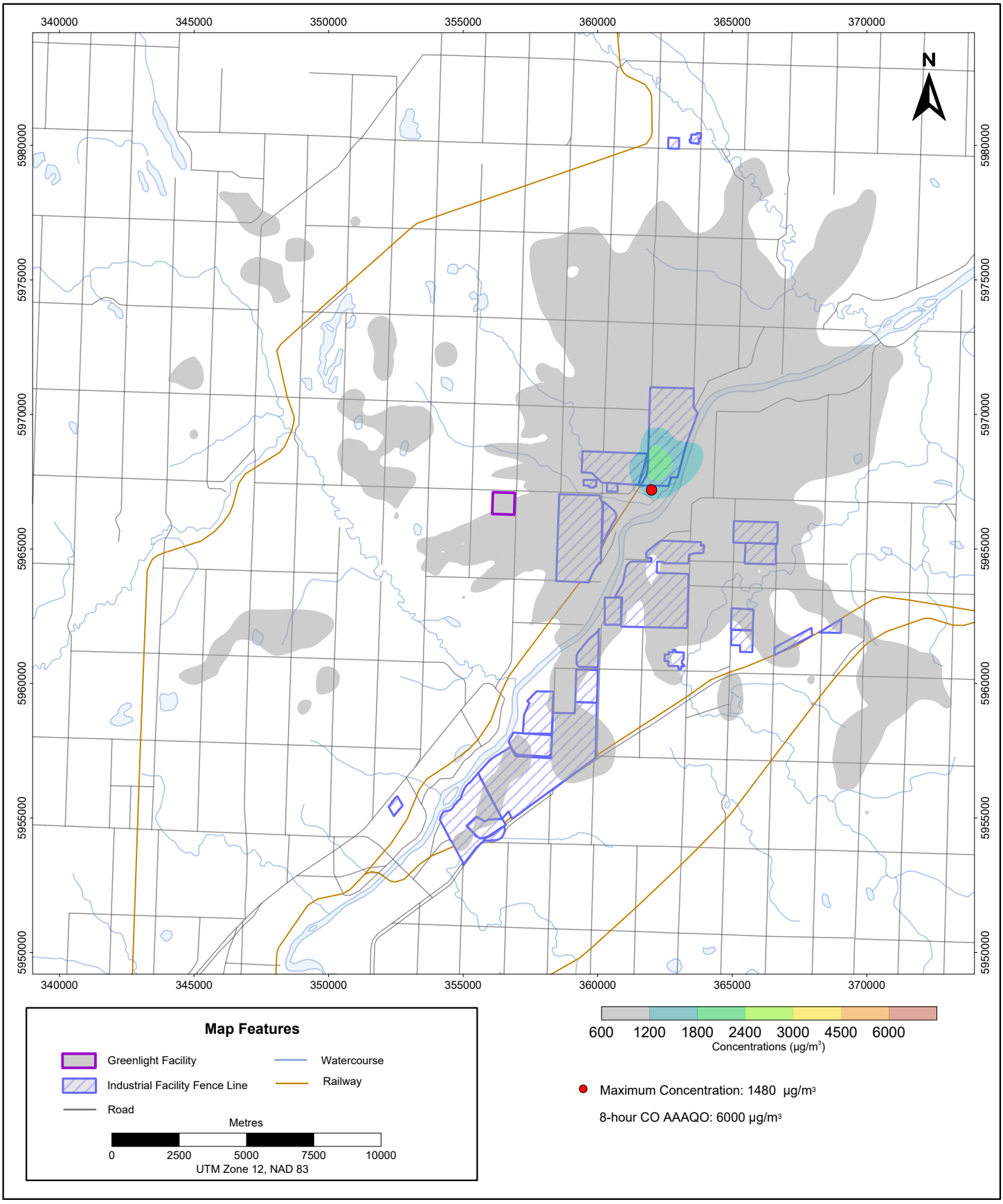
FIGURE NO.
C.3



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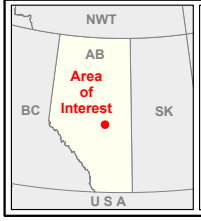

Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 8-hour CO Concentrations (Base Case)

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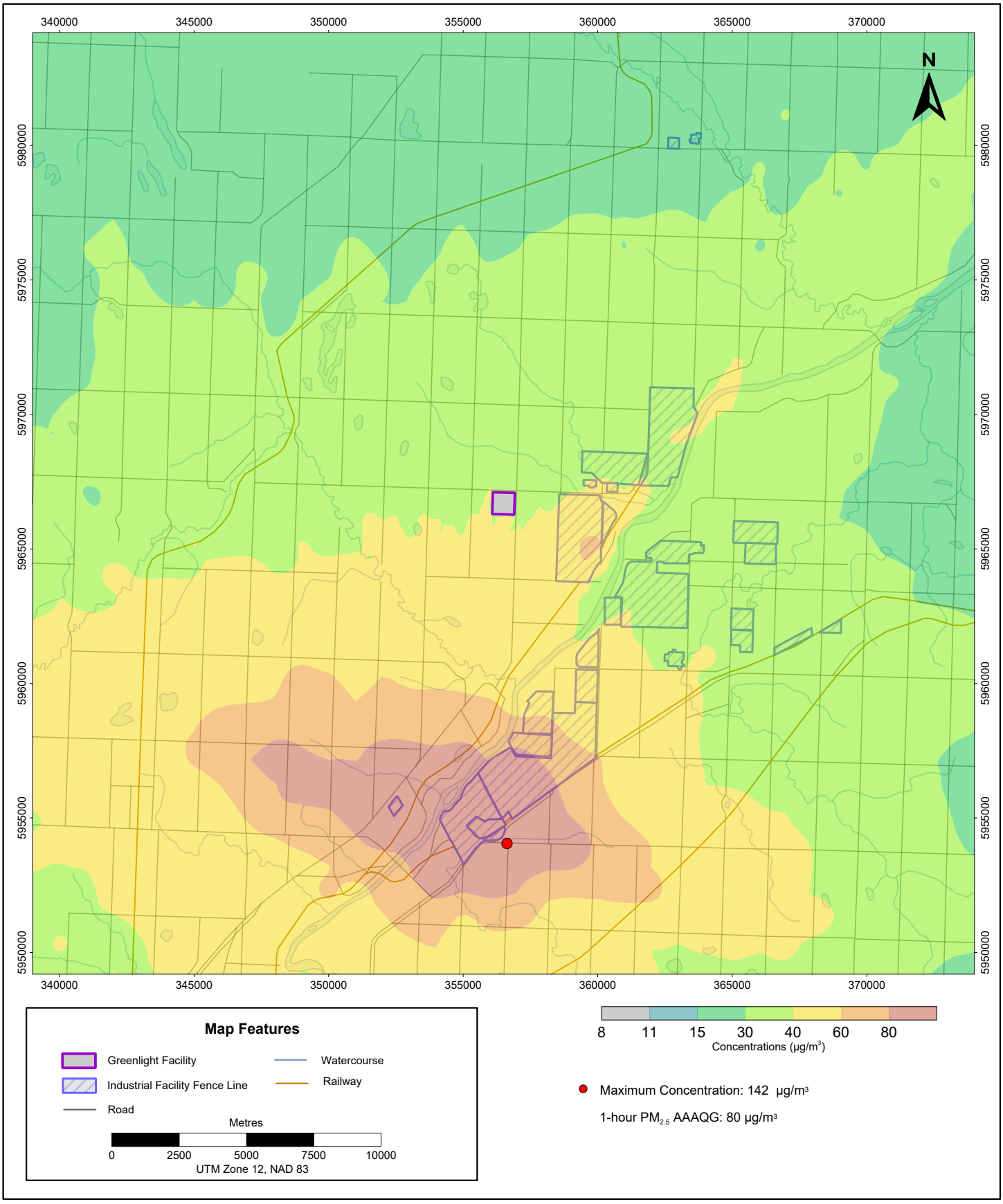
FIGURE NO.
C.4



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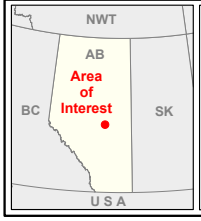

Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 1-hour $PM_{2.5}$ Concentrations (Base Case)

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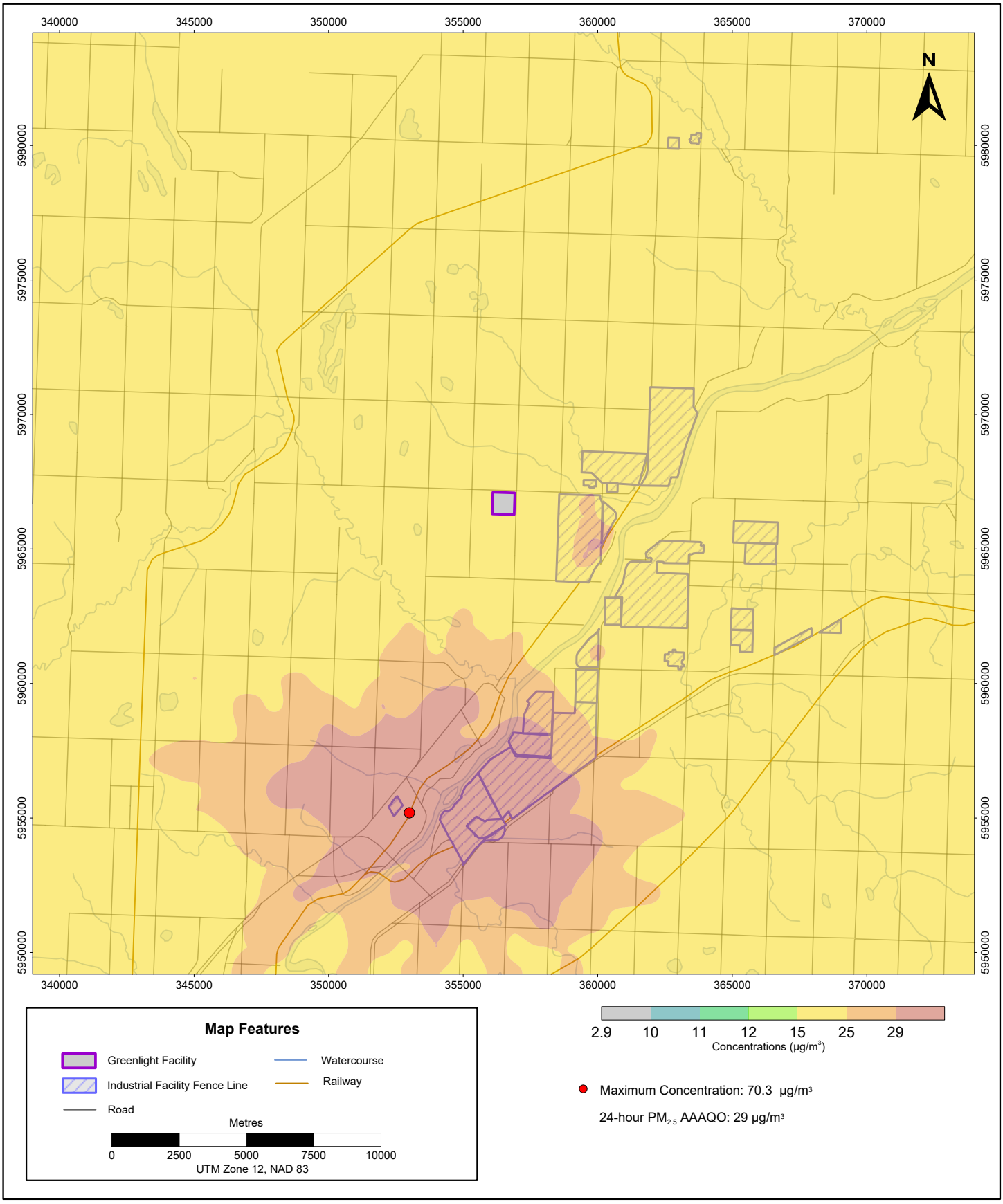
FIGURE NO.
C.5



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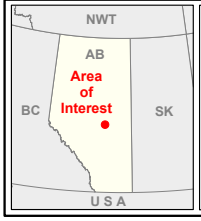

Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 24-hour $PM_{2.5}$ Concentrations (Base Case)

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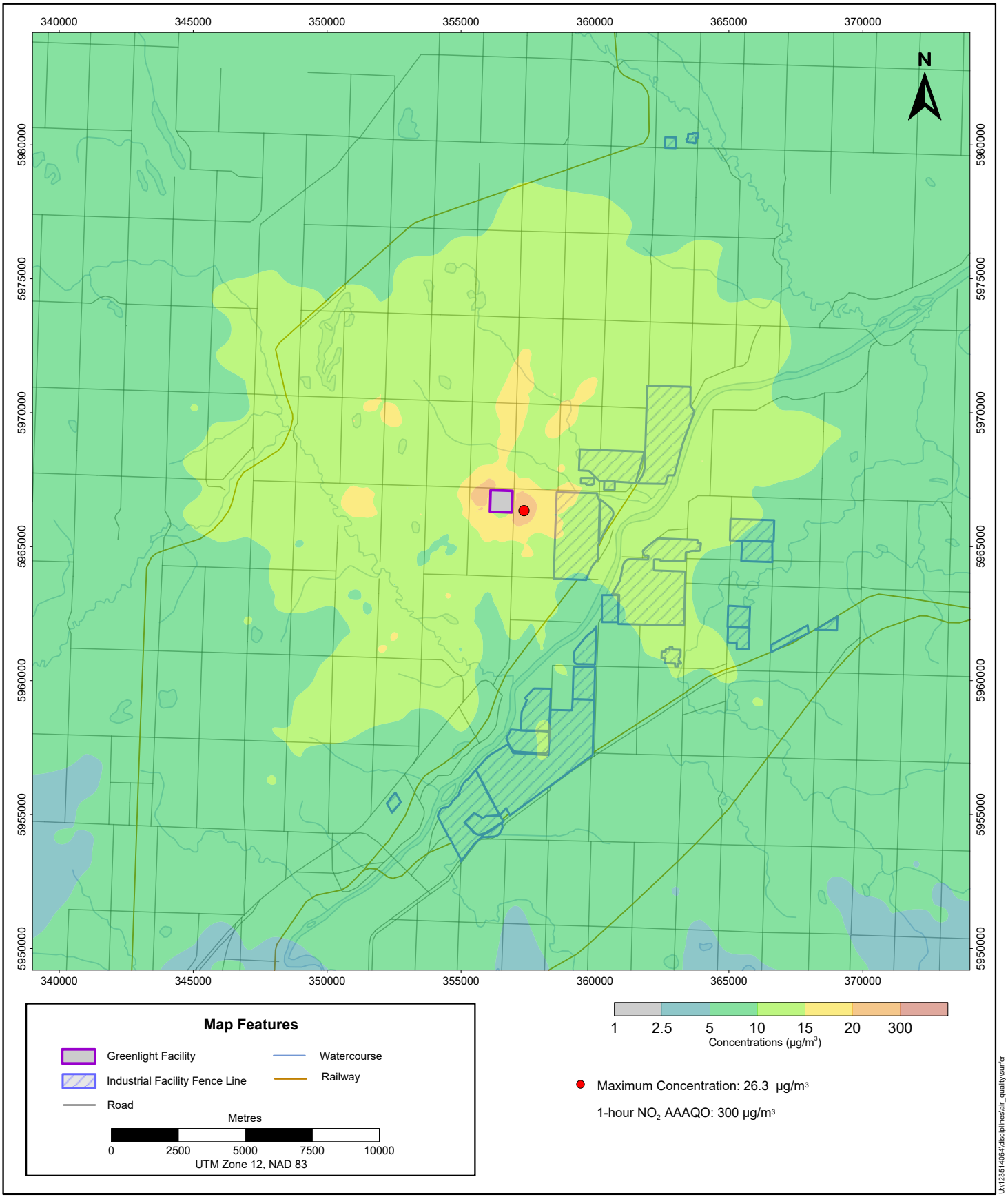
FIGURE NO.
C.6



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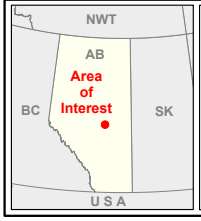

Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 1-hour NO_2 (ARM2) Concentrations (Project Case)

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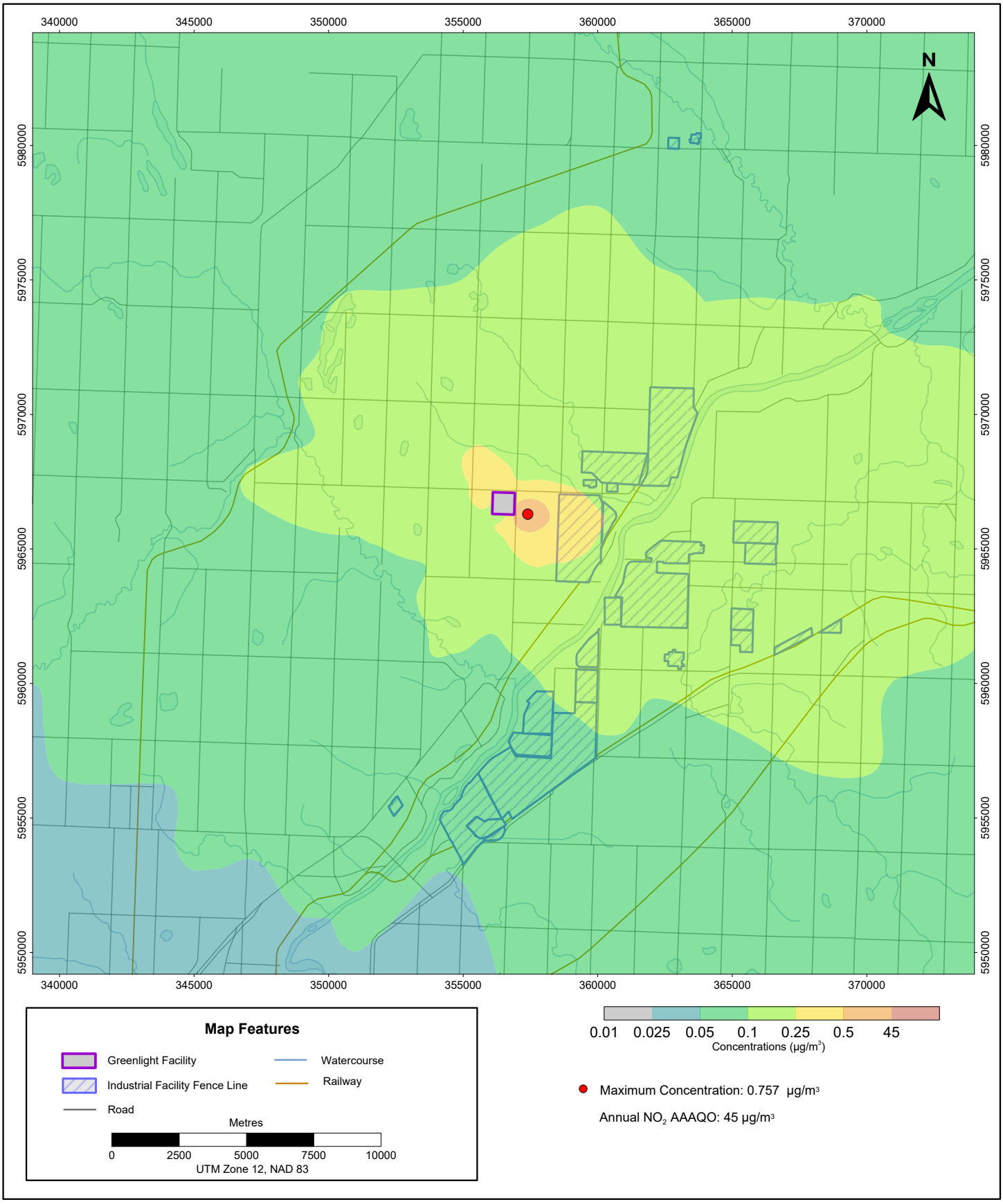
FIGURE NO.
C.7



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Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted Annual NO_2 (ARM2) Concentrations (Project Case)

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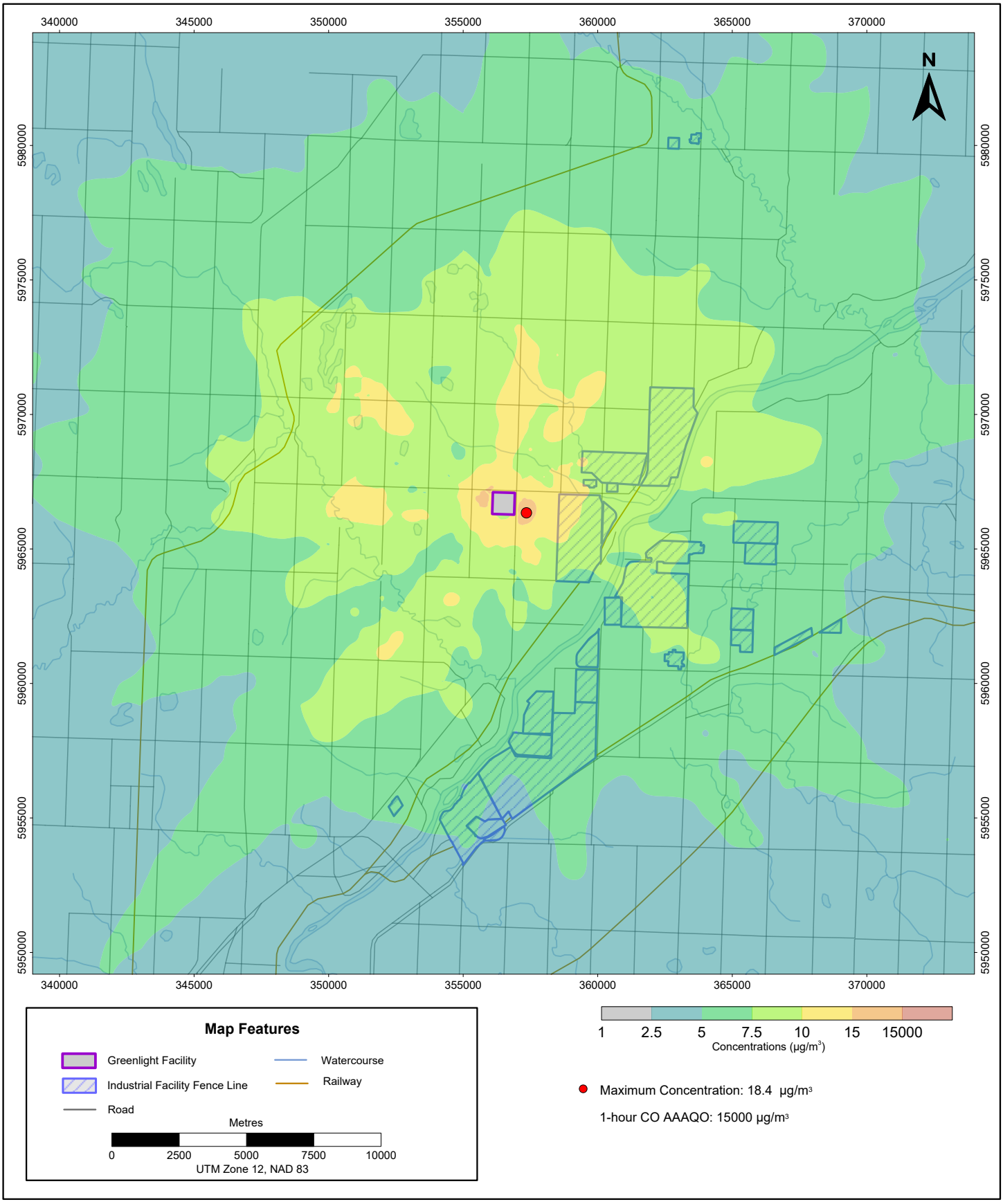
FIGURE NO.
C.8



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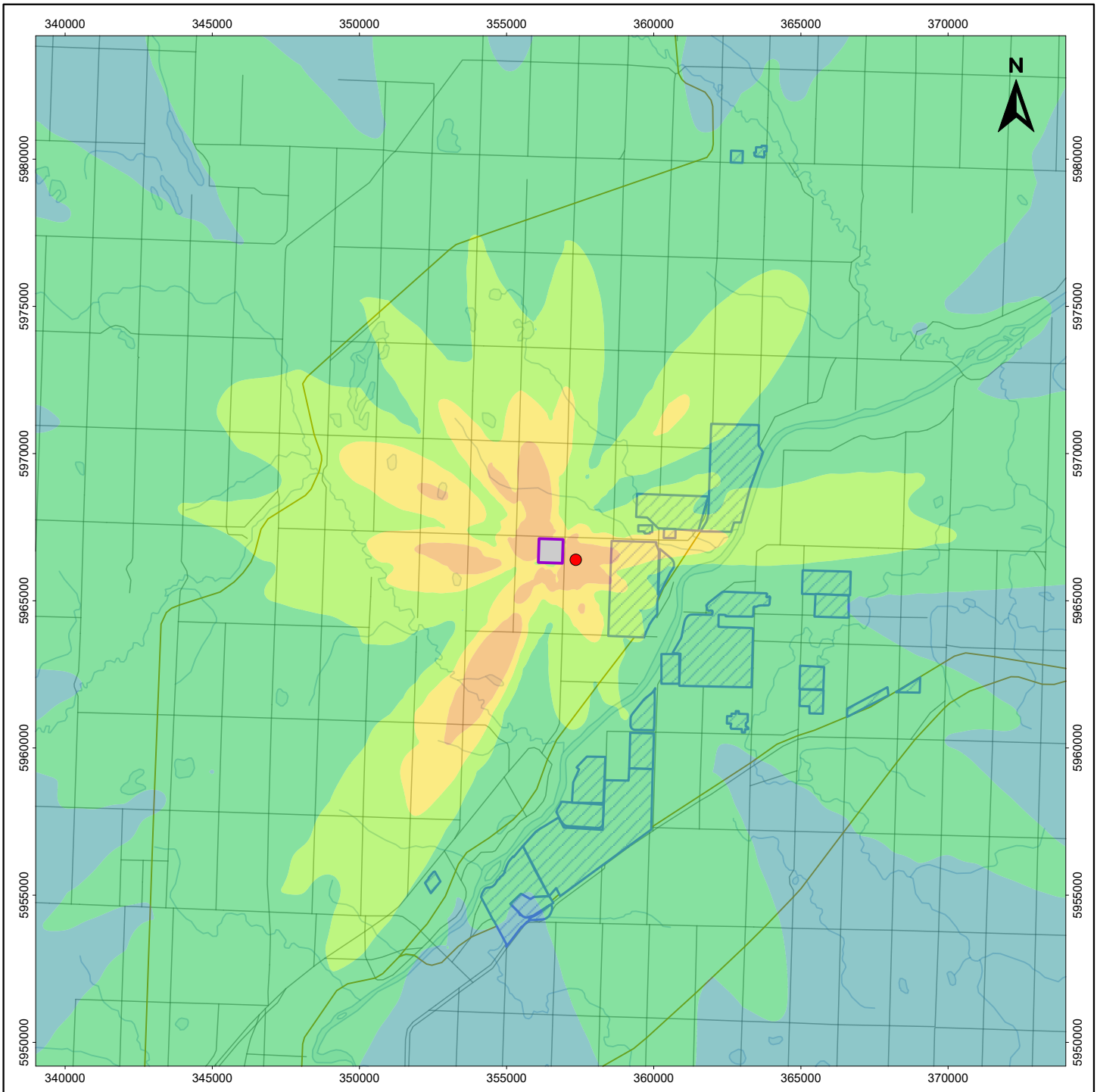
Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 1-hour CO Concentrations (Project Case)

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
C.9



Map Features

- Greenlight Facility
- Industrial Facility Fence Line
- Road
- Watercourse
- Railway

Metres

0 2500 5000 7500 10000

UTM Zone 12, NAD 83

0.5 1 2.5 5 7.5 10 6000

Concentrations (µg/m³)

Maximum Concentration: 16.0 µg/m³

8-hour CO AAAQO: 6000 µg/m³

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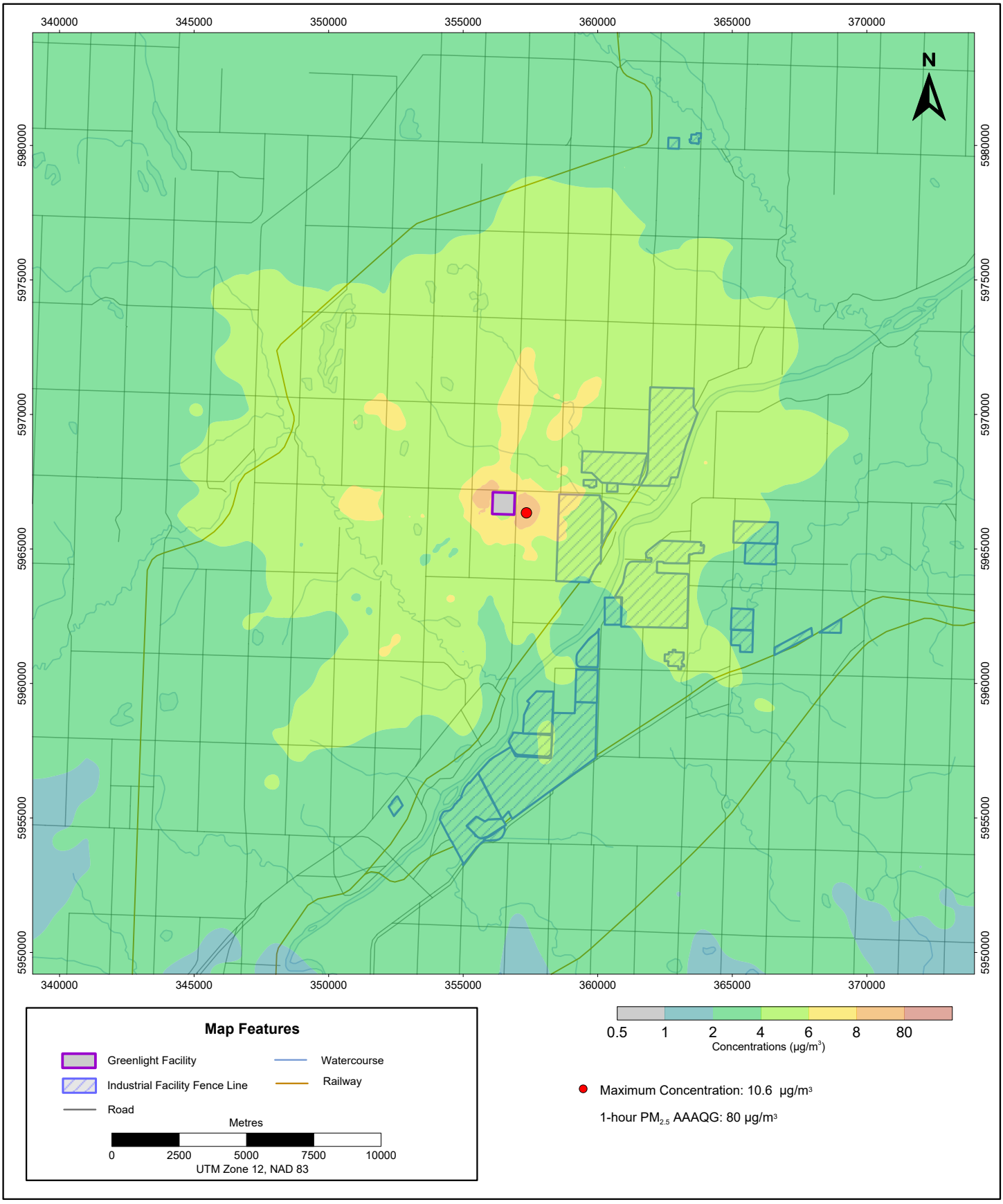
Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 8-hour CO Concentrations (Project Case)

PREPARED BY Stantec

PREPARED FOR Greenlight Electricity Centre Limited Partnership

FIGURE NO. C.10



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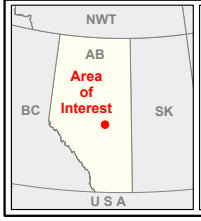


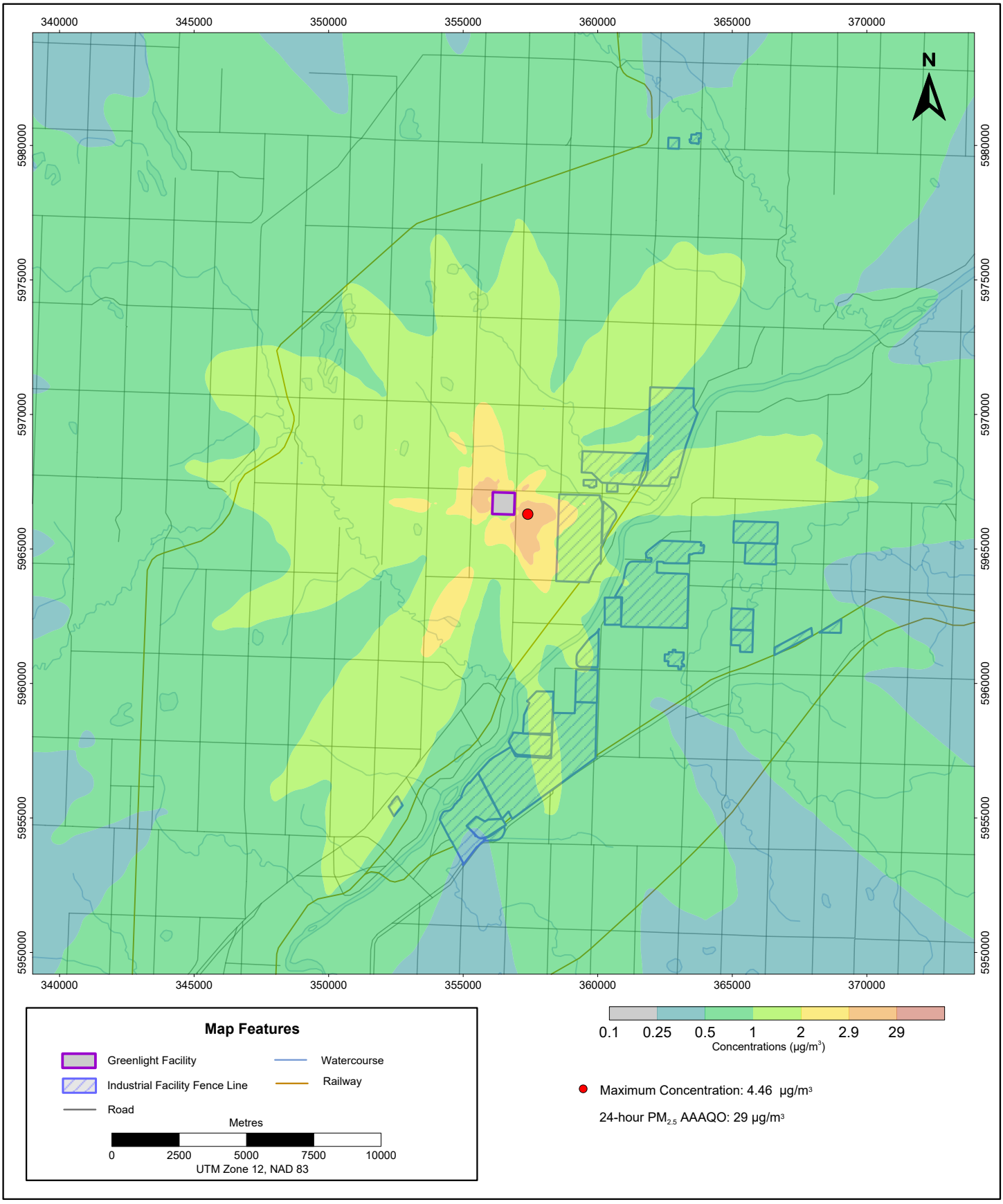
Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 1-hour $PM_{2.5}$ Concentrations (Project Case)

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
C.11



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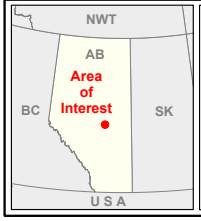


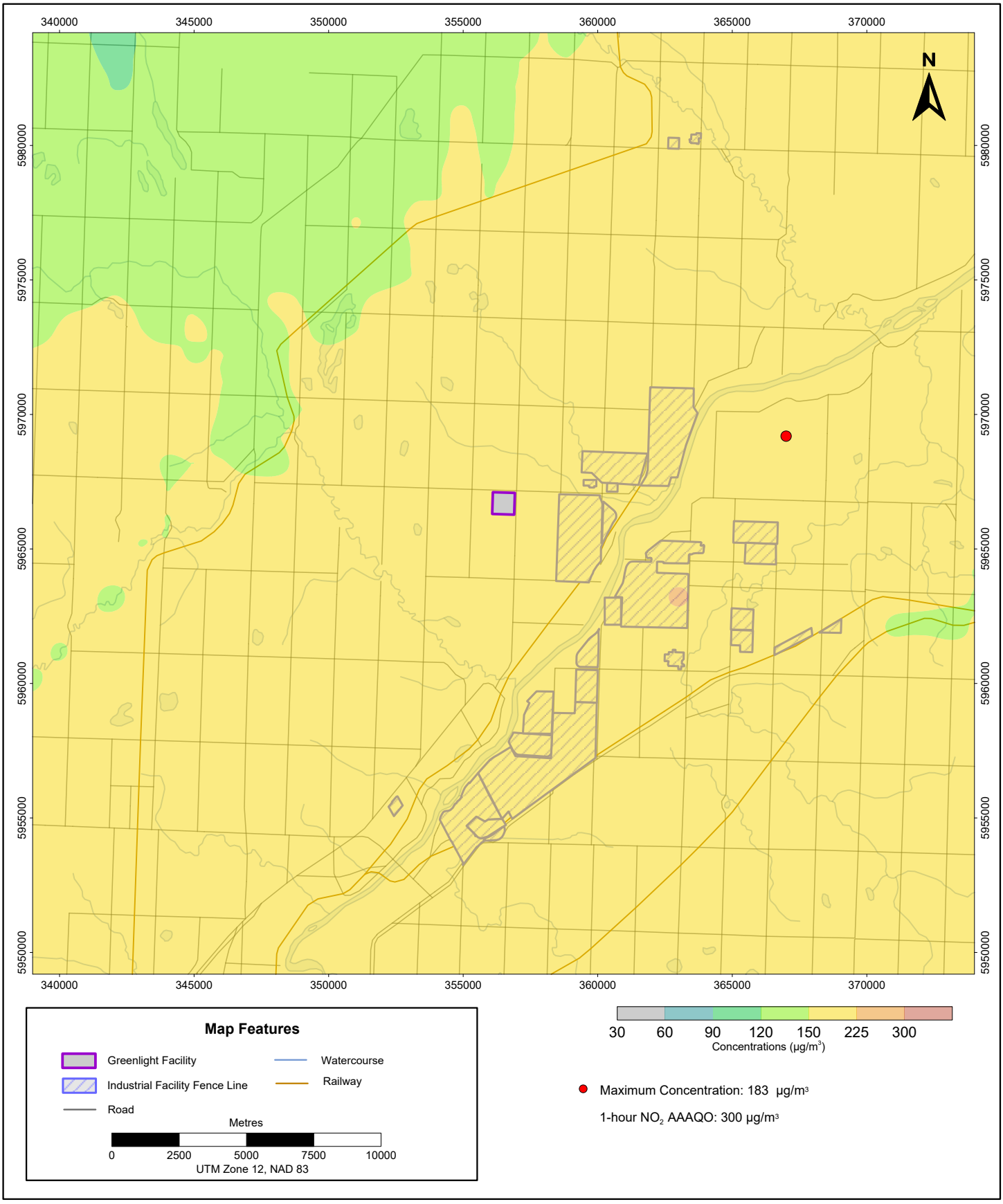
Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 24-hour $PM_{2.5}$ Concentrations (Project Case)

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
C.12



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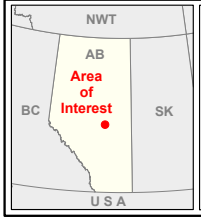


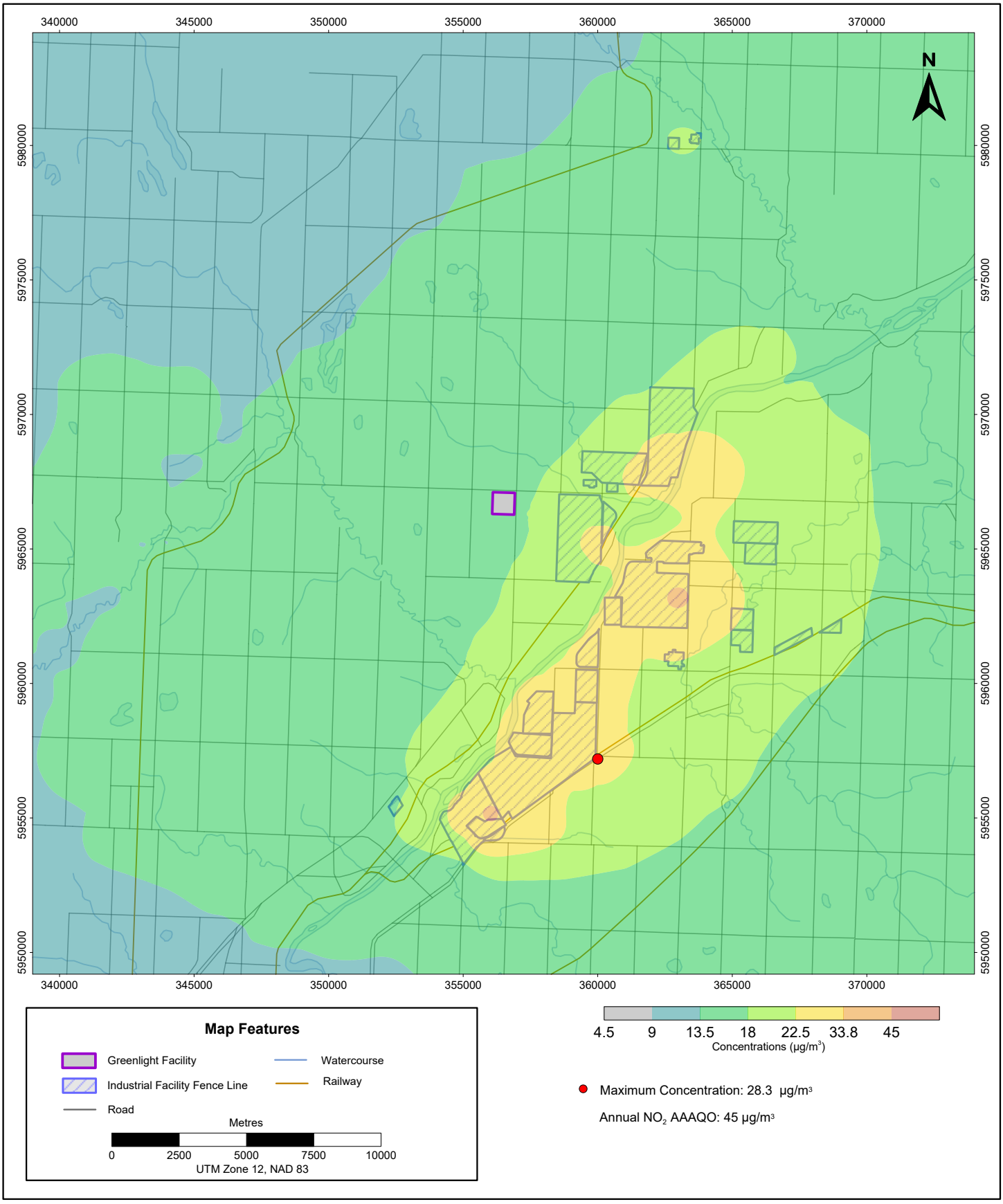
Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 1-hour NO_2 (ARM2) Concentrations (Application Case)

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
C.13



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Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted Annual NO_2 (ARM2) Concentrations (Application Case)

PREPARED BY
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PREPARED FOR
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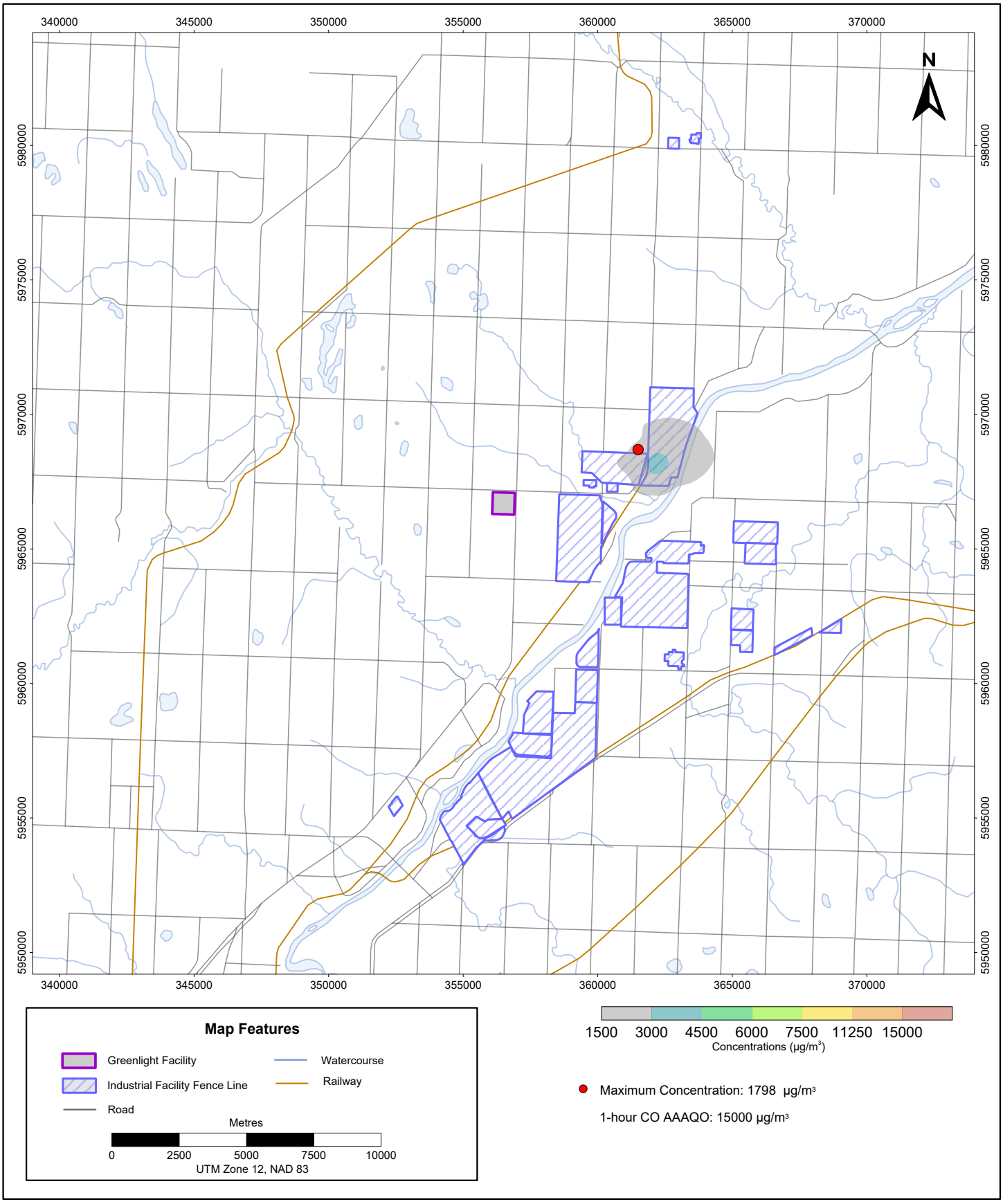
FIGURE NO.
C.14



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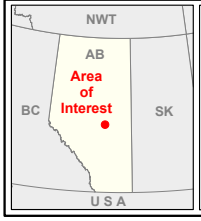


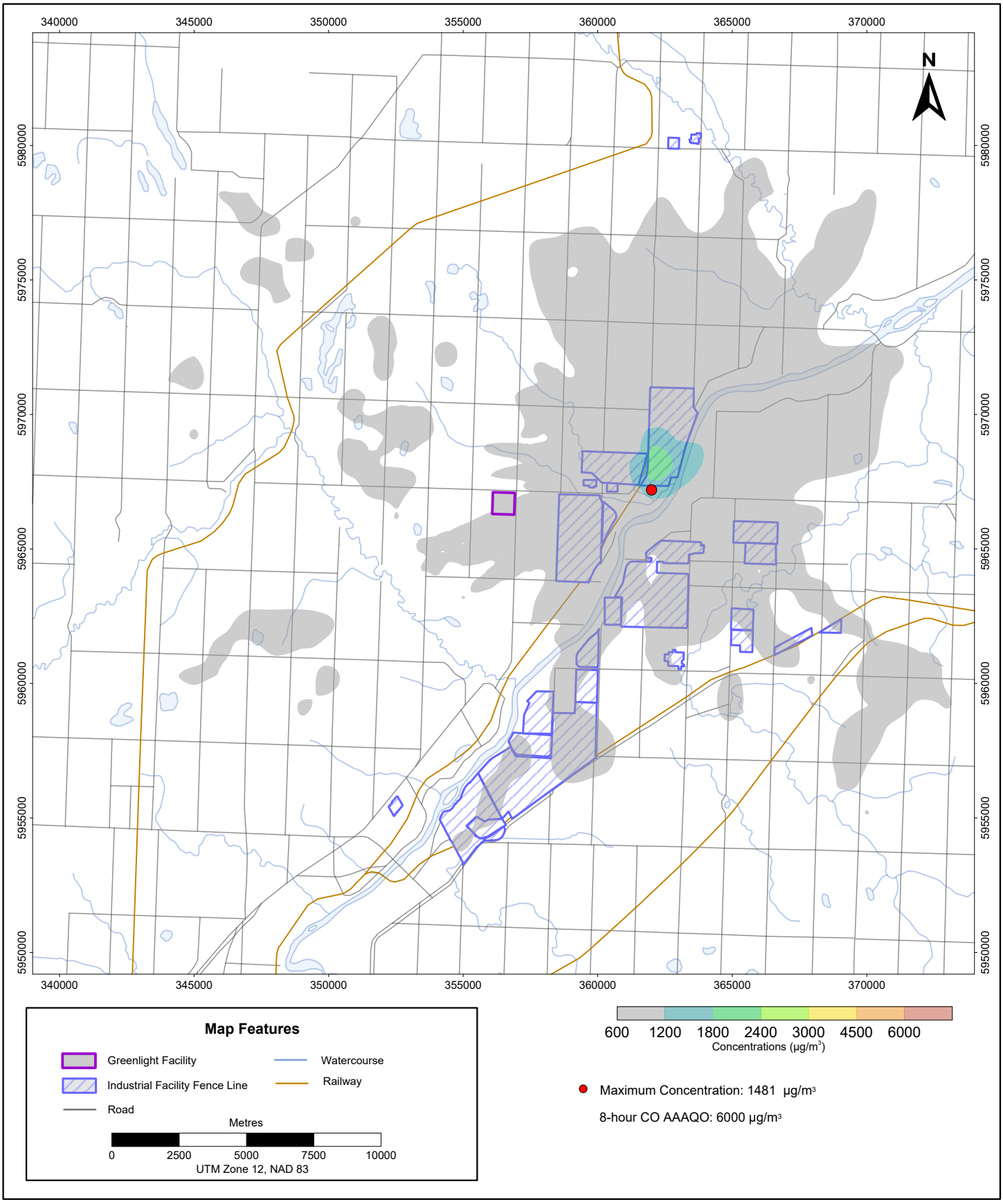
Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 1-hour CO Concentrations (Application Case)

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
C.15



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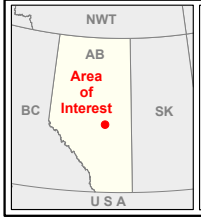


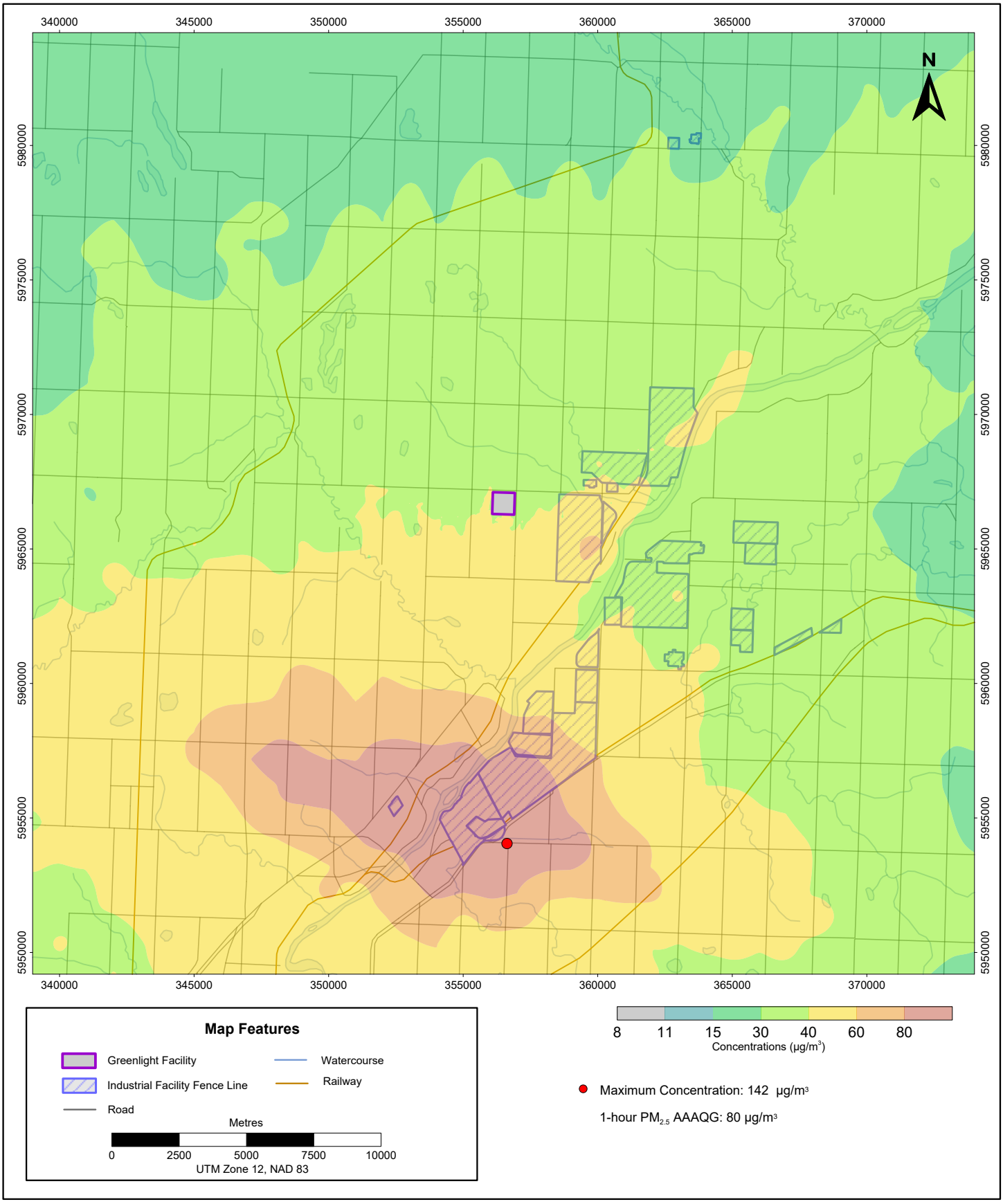
Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 8-hour CO Concentrations (Application Case)

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
C.16



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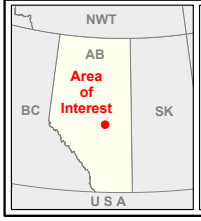


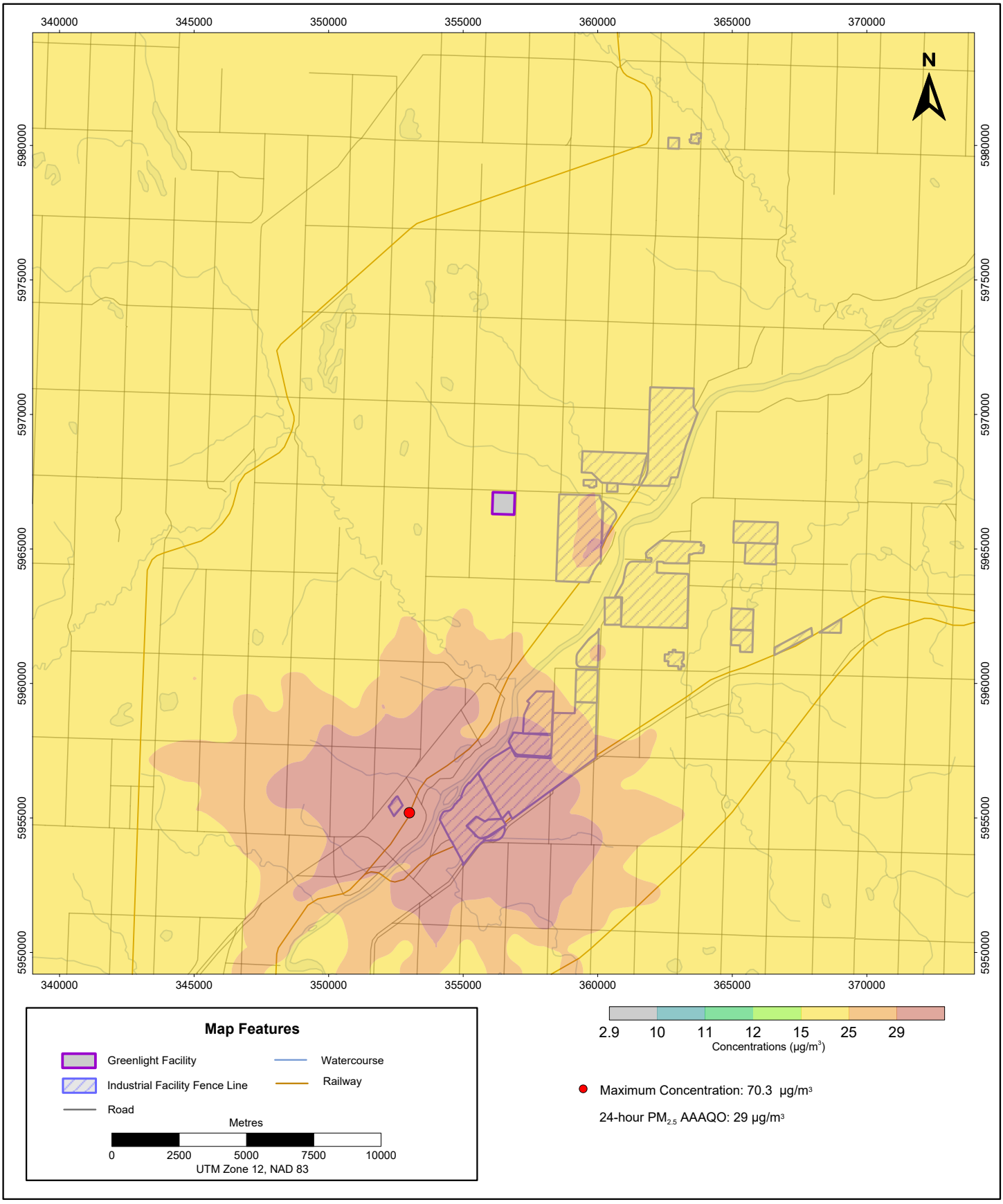
Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 1-hour $PM_{2.5}$ Concentrations (Application Case)

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
C.17



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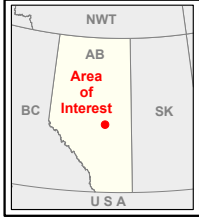

Air Quality Assessment for GreenLight Electricity Centre

Maximum Predicted 24-hour $PM_{2.5}$ Concentrations (Application Case)

PREPARED BY
Stantec

PREPARED FOR
Greenlight Electricity Centre Limited Partnership

FIGURE NO.
C.18

Appendix D Environmental Evaluation

Greenlight Electricity Centre Project
Environmental Evaluation

August 2025

Prepared for:
Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP.

Prepared by:
Stantec Consulting Ltd.

Project/File:
123514064

Stantec

Limitations and Sign-off

This document entitled Environmental Evaluation was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP. (the “Client”) to support the regulatory review process for its Alberta Utilities Commission Application (the “Application”) for the Greenlight Electricity Centre Project (the “Project”). In connection therewith, this document may be reviewed and used by the Alberta Utilities Commission participating in the review process in the normal course of its duties. Except as set forth in the previous sentence, any reliance on this document by any other party or use of it for any other purpose is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The information and conclusions in the document are based on the conditions existing at the time the document was published and does not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by the Client or others, unless expressly stated otherwise in the document. Any use which another party makes of this document is the responsibility and risk of such party. Such party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other party as a result of decisions made or actions taken based on this document.

Reviewed by: Strand, Jim Digitally signed by Strand, Jim Date: 2025.08.22 15:08:11 -06'00'

Signature

Jim Strand

Printed Name

Approved by: Doupe, Jason Digitally signed by Doupe, Jason Date: 2025.08.22 15:07:20 -06'00'

Signature

Jason Doupe

Printed Name

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List of Tables

List of Appendices

Acronyms / Abbreviations

µg/m^3	micrograms per cubic metre
AAAQO/G	Alberta Ambient Air Quality Objectives/Guidelines
ACIMS	Alberta Conservation Information Management System
AEP	Alberta Environment and Parks
AEPA	Alberta Ministry of Environment and Protected Areas (formerly Alberta Environment and Parks [AEP])
AER	Alberta Energy Regulator
AQMG	Air Quality Model Guideline
ASL	ambient sound level
AUC	Alberta Utilities Commission
BSL	basic sound level
CAC	criteria air contaminant
CCGT	combined cycle gas turbine
CO	carbon monoxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
dB	decibels
dBA	A-weighted decibel
dBC	C-weighted decibel
ECCC	Environment and Climate Change Canada
ECOC	Ecological Community of Conservation Concern
EE	Environmental Evaluation
EPEA	*Environmental Protection and Enhancement Act*
FAP	Fort Air Partnership
FWMIS	Fisheries and Wildlife Management Information System
GECGP	Greenlight Electricity Centre GP Ltd.
GOA	Government of Alberta
GOC	Government of Canada
ha	hectare
HAMP	Heartland Air Monitoring Partnership
HRSG	heat recovery steam generator

IH-DIZ	Industrial Heartland – Designated Industrial Zone
km	kilometre
LAA	Local Assessment Area
LFN	low frequence noise
mbgs	meters below ground surface
MW	megawatt
NCIA	Northeast Capital Industrial Association
NIA	noise impact assessment
NO	nitrogen oxide
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
NSR	Natural Subregion
PDA	Project Development Area
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
PSL	permissible sound level
RAA	Regional Assessment Area
RNM	Regional Noise Model
RNMP	Regional Noise Management Plan
RUSLEFAC	Revised Universal Soil Loss Equation for Application in Canada
SAR	Species at Risk
SARA	*Species at Risk Act*
SMU	soil map unit
SOCC	Species of Conservation Concern
Stantec	Stantec Consulting Ltd.
STC	sound transmission class
the Project	GreenLight Electricity Centre Project
TCM	Total Conversion Method
TF/EE	transboundary flows/exceptional events
TP	Thermal Powerplant
VC	valued component
W4M	west of the fourth meridian

1 Introduction

Stantec Consulting Ltd. (Stantec) was retained by Greenlight Electricity Centre GP Ltd. (GECGP), on behalf of Greenlight Electricity Centre LP. to conduct an Environmental Evaluation (EE) for the proposed Greenlight Electricity Centre Project (the Project).

Pending regulatory approval, the Project will be developed in two phases, each consisting of four 466 megawatt (MW) gas/steam turbine line ups, for a total of 1,864 MW at full build out. Construction of the Project is anticipated to start in 2026, with commissioning to be completed by 2031. The Project is expected to be in operation for approximately 30 years.

Proponents of power facilities are required to submit an EE at a level of detail commensurate with the size and type of potential effect(s) of the Project. Requirements associated with the EE are outlined under Alberta Utilities Commission (AUC) Rule 007 Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, Hydro Developments and Gas Utility Pipelines (Rule 007) (AUC 2024), Thermal Powerplant (TP)20. This report satisfies the EE requirements as outlined in TP20 and is organized into three sections: Project Background (Section 2), EE Approach (Section 3), and the evaluation of Project interactions for each valued component (Section 4 through Section 10). An *Environmental Protection and Enhancement Act* (EPEA) application is also being prepared for the Project, which will be filed with Alberta Environment and Protected Areas (AEPA).

2 Project Background

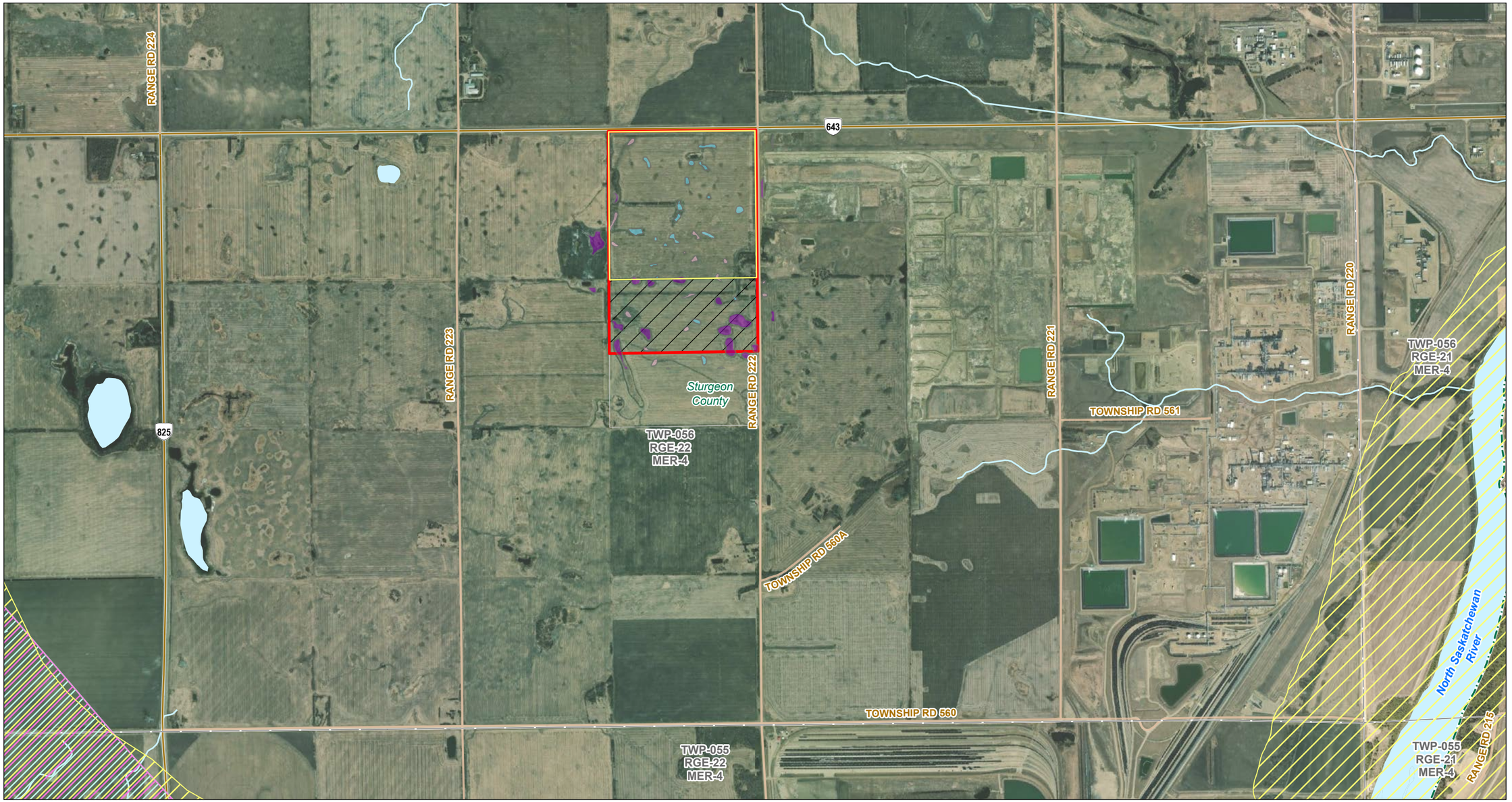
2.1 Project Description

The Project is a combined cycle power generation facility that will feature four 1x1 gas/steam turbine line ups, utilizing H-class combined cycle gas turbines (CCGT) supplied with pipeline spec natural gas. The power generation facility will generate a total plant output of 1864 MW. Natural gas will be supplied from a pipeline tied to an existing natural gas distribution network. The Project will require up to 297,272 gigajoules per day of pipeline spec natural gas as fuel, with an estimated net plant efficiency between 55-65%. The waste heat from the gas turbine exhaust will be utilized in Heat Recovery Steam Generators (HRSG) to produce steam that will ultimately power the steam turbine (cogeneration). In addition to the power generating components, the balance of plant will consist of fuel gas treatment components, generator step-up transformers, associated power distribution modules, and the demineralized water treatment facility with associated storage tanks.

The electricity produced will be put into the Alberta Interconnected Electric System to meet the electric power requirements of the province and to supply data centres. The Project will connect to the Alberta Interconnected Electric System via a substation connection with 240 kV transmission lines. Make-up water, required for the steam cycle, will be sourced locally from municipal water supplied by Sturgeon County. Other components of each power train include an air-cooled condenser and a generator step-up transformer.

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

The power plant boundary is located within NE-10-056-22-W4M (see Plot Plan in Appendix A). GECGP is currently refining Project engineering design and only minor changes in equipment or layout are anticipated. The Project Development Area (the PDA) is within NE-10-056-22-W4M and the north half of SE-10-056-22-W4M. Legal subdivisions 07-10-056-22-W4M and 08-10-056-22-W4M will be used for long term storage and workspace (Laydown Area) (see Figure 2.1 for details).



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

Wetland and Ephemeral Waterbody
- EW
- MGII
- MGIII
- MGIV
- Project Development Area
- Power Generation Facility
- Laydown Area
- Road
- Watercourse
- Quarter Section
- Waterbody
- Key Wildlife and Biodiversity Zones
- Sensitive Raptor Range
- Sharp Tailed Grouse Survey

0 1
kilometres
(At original document size of 11x17) 1:22,000

N

Stantec

Project Location — Prepared by NF on 2025-08-07
NE ¼ and SE ¼ 10-056-22 W4M, Alberta

Client/Project — 123514064-0011
Greenlight Electricity Centre Limited Partnership
Greenlight Electricity Centre Project
Environmental Protection and Enhancement Act Application

Figure No.
2.1

Title
Plant Location

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2.1.1 Physical Activities

Physical Activities during each stage of Project construction and operation are presented in Table 2.1.

Table 2.1 Project Physical Activities

Project Phase	Activity	Associated Activities and Equipment
Construction	Transportation of Equipment	Equipment will be transported by truck to the PDA along public highways, existing access roads. and an access driveway developed for the Project
Construction	Site Preparation (vegetation clearing)	Vegetation clearing will be required to remove vegetation communities from the PDA. Vegetation will be cleared during topsoil removal (see soil salvage and grading below). Woody vegetation will likely be removed by hand falling and shrub cover using mulchers or brush cutters
Construction	Site Preparation (soil salvage and grading)	Topsoil and upper subsoil will be salvaged from the disturbance footprint and retained in stockpiles for recovery and use during site reclamation. Grading will be required to prepare (i.e., level) the PDA for infrastructure installation. Equipment used will likely include graders, dozers, excavators, and scrapers
Construction	New Infrastructure Installation	Once the PDA is graded and cleared, buildings and other equipment will be installed. Equipment used during this activity includes cranes, semitrailers, trucks, excavators, and pile drivers
Construction	Clean-up and Reclamation	Upon completion of construction activities, clean-up procedures will be initiated using dozers, backhoes/excavators, and graders. Garbage or debris will be removed and disposed of in compliance with local regulations. A gravel surface will be placed over portions of the PDA where all-season access is required during operation. Topsoil and subsoil will be stored in the eastern portion of NE-10-056-22-W4M. The remainder of the PDA will be contoured and graveled
Operation	Power Generation	Initiation of gas-turbine power generation and associated equipment and facilities. During operation, maintenance activities will be initiated

2.2 Project Setting

The Project is located within the Dry Mixedwood Natural Subregion (NSR) of the Boreal Natural Region of Alberta (Natural Regions Committee 2006) on agricultural land with some patches of deciduous forest land with aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) and numerous small wetlands. The Dry Mixedwood NSR lies between the Central Parkland and Central Mixedwood NSRs. The Dry Mixedwood NSR has warmer summers and milder winters than other subregions in the Boreal Natural Region. Most annual precipitation falls during the growing season, with peak precipitation in June and July (Natural Regions Committee 2006). Terrain is gently undulating glacial till or lacustrine plains. Some hummocky uplands also occur. Aspen forests are prevalent on upland landscapes with mixed understories of rose (*Rosa* sp.), low-bush cranberry (*Viburnum edule*), beaked hazelnut (*Corylus cornuta*), and Canada buffaloberry (*Shepherdia canadensis*). Wetlands occupy approximately 15% of the subregion, and include 10% organic wetlands, and 5% shallow peat or mineral wetlands (Natural Regions Committee 2006). Land-use in the region includes forestry, oil and gas activity, grazing and cultivation (Natural Regions Committee 2006). Soils in the subregion include gray and dark gray luvisols on uplands, and gleysols and organic soils in wetlands (Natural Regions Committee 2006).

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

There are three known residential dwellings within 2 kilometres (km) of the Project. The nearest known residential dwelling is located approximately 1 km northwest of the Project. The nearest Indigenous reserve is located approximately 45 km from the Project.

2.3 Consultation

As described in Appendix B and Sections TP31 (Consultation with Local Jurisdictions) and TP32 (Consultation Results) of the main AUC application, GECGP undertook a consultation program in support of the Project. The consultation program included outreach to Indigenous communities, and stakeholders, consisting of local business owners, landowners, residents, and municipal departments. The consultation program included two open houses.

As of July 2025:

- GECGP has not received feedback about the Project from any Indigenous groups
- The key concern expressed to date is related to proximity to existing land use. At the June 2023 Open House, GECGP heard from one landowner concerned about the location of the Project in relation to their farm. GECGP explained that the location is within the IH-DIZ purposefully to reduce land use concerns. No additional follow-up except Project updates as available were requested

3 Environmental Evaluation Approach

This EE considers the potential effects of construction and operation of the Project on valued ecosystem components, hereon referred to as valued components (VCs). Timing considerations and standard best practices will be incorporated into design, construction and operation to further address general and site-specific effects.

The Project's EE scope was developed in the context of AUC Rule 007 TP requirements (TP20), Project activities and components, the Project setting, input from regulatory consultation, and results from desktop and field studies.

Sections 3.1 through 3.6 outline the methods used in the development of this EE.

3.1 Scope of Assessment

The EE focuses on VCs, which are environmental elements of particular value or interest to regulators and other parties and are identified based on biophysical and socio-economic elements. To focus the EE on matters of relevance, likely interactions of the Project with the surrounding biophysical and socio-economic environment are identified using a variety of sources, including:

- federal and provincial regulatory requirements
- input from GECGP's Consultation and Engagement Program
- existing regional information and documentation regarding environmental (biophysical and socio-economic) components within the vicinity of the Project (e.g., species at risk [SAR])
- documentation relating to other projects and activities within the vicinity of the Project
- results of desktop and field studies completed for the Project
- professional judgment of environmental assessment practitioners based on experience with similar projects elsewhere and other projects and activities around the Project.

The VCs that were selected for the EE include those which:

- represent a broad environmental, ecological or human environment component that might be affected by the Project, or
- are of scientific, historical, or archaeological importance

The rationale for selecting each VC is explained in Section 4, Table 4.1 and further described in the applicable section (see Sections 5 through 10).

3.2 Potential Effects and Effect Pathways

The evaluation of each potential Project effect for each selected VC begins with a description of the pathways through which specific Project activities could result in an environmental effect.

The potential effects and pathways by which the Project could affect the VCs were identified based on Project knowledge, scientific literature, and professional judgment. The Project's potential effects are discussed relative to baseline conditions for each VC.

3.3 Assessment Areas and Temporal Boundaries

3.3.1 Assessment Areas

Each VC was screened to determine the spatial extent over which direct or indirect effects could reasonably occur and be evaluated. This involved reviewing existing literature and using professional judgement. Spatial boundaries for evaluation of VCs were as follows:

- Project Development Area (PDA) – The anticipated area of physical disturbance associated with the construction and operation of the Project. The PDA is approximately 98 hectares (ha).
- Local Assessment Area (LAA) – Encompasses the area in which Project-related effects (direct or indirect) are predicted to occur. The LAA encompasses the PDA and is specific to each VC (Table 3.1).
- Regional Assessment Area (RAA) – The area within which potential cumulative effects – the predicted likely residual effects from the Project in combination with those of past, present, and reasonably foreseeable future projects and physical activities are evaluated. The RAA encompasses the PDA and the LAA and is specific to each VC (Table 3.1).

Table 3.1 Study Area Boundaries for VCs included in the Environmental Evaluation

Valued Component	LAA	RAA
Air Quality	Includes an area of 35 km by 35 km	Same as the LAA
Acoustic Environment	Includes the PDA with a 1.5 km buffer	Includes the PDA with a 3 km buffer
Groundwater	Includes the PDA with a 100 m buffer	Includes the PDA with a 1000 m buffer
Soil and Terrain	Includes the PDA with a 100 m buffer	Not applicable
Vegetation and Wetlands	Includes the PDA with a 100 m buffer	Includes the PDA with a 5 km buffer
Wildlife Species and Habitat	Includes the PDA with a 1000 m buffer	Includes the PDA with a 5 km buffer

Additional details regarding how assessment areas have been defined is available in the respective VC sections.

3.3.2 Temporal Boundaries

Temporal boundaries identify when an environmental effect will be evaluated in relation to specific Project phases and activities. Temporal boundaries for this EE include:

- **Construction:** it is anticipated that construction will take approximately three years, with site preparation beginning in 2027 and lasting until 2030
- **Operation:** the anticipated in-service date is Q1 2031. The Project is designed to operate for approximately 30 years.

3.4 Mitigation of Potential Project Effects

Mitigation measures are applied to the identified potential effects of the Project on the VCs. These include industry standard best practices, compliance with legislation, regulations and guidelines, and other measures applicable to the Project.

3.5 Discussion of Residual Project Effects

Residual effects (i.e., environmental effects that remain after mitigation has been applied) are described for each VC after considering how the proposed mitigation will alter or reduce the effect. Residual effects are evaluated on a Project-wide basis and a discussion of residual PDA specific effects are presented for each VC. Criteria used to assess residual effects on VCs are provided in their respective VC sections.

3.6 Determination of Significance

As outlined in TP20 of AUC Rule 007, the EE must determine the significance of residual effects. The definition of significance of an effect is “[a] measure of the magnitude, duration, frequency, timing, probability of occurrence, ecological and social context, geographic extent, and degree of reversibility of an effect on a Valued Ecosystem Component” (AUC 2024a).

Significant effects are those that may cause a change in the VC that will alter its status or integrity beyond an acceptable level or threshold. The significance definition identifies and incorporates listed or legal standards or thresholds for defining significance of effects for a VC, where available. Where thresholds are not set by guidelines or regulations, the threshold is developed using a combination of input from the consultation process, resource management objectives, scientific literature, and professional judgment of acceptable changes in the state of the VC.

For the purpose of this EE, significant adverse residual effects are defined in each VC section (Sections 5 through 10).

4 Selection of Valued Components

VCs considered for the Project are listed in Table 4.1 with rationale for including or excluding them in the EE. Table 4.1 considers the Project's physical activities (as listed in Section 2.1.1) that have the potential to interact with each VC during the Project's construction and operation phase.

VCs included in this EE are:

- Air Quality
- Acoustic Environment
- Groundwater
- Soils and Terrain
- Vegetation and Wetlands
- Wildlife and Wildlife Habitat

Table 4.1 Valued Component Rationale

Valued Component	Potential Project Interaction	Included in Assessment	Rationale for Inclusion or Exclusion in the EE	Section(s) where addressed in the EE
Air Quality	✓	✓	• The Project's construction and operation activities will contribute to air emissions within the LAA and RAA.	Section 5
Acoustic Environment	✓	✓	• The Project's construction and operation activities will cause an increase to the local industrial noise level within the LAA and RAA.	Section 6
Surface Water Bodies and Hydrology	-	-	• The Project is located approximately 4 km west of the North Saskatchewan River and 4.4 km southwest of the Sturgeon River. Ten unnamed tributaries to the North Saskatchewan River are within 5 km of the PDA. As there are no watercourses in close proximity to the PDA and no work below the ordinary high-water mark, it is unlikely that construction of the Project will affect surface water. • Water for the Project will be provided from a municipal source and diversion of water from the North Saskatchewan River or other watercourse is not anticipated. • No unmitigated flows will be directed to nearby waterbodies based on the existing land development and the natural vegetative buffers between the PDA and nearby waterbodies. In the event stormwater needs to be released, it must first meet EPEA water quality guidelines, before being released. The release of stormwater will be designed to maintain existing drainage patterns so adjacent properties are not affected.	-
Aquatic Species and Habitat	-	-	• The Project is not anticipated to interact with surface water and therefore is not anticipated to interact with fish and fish habitat. All construction activities will occur within the PDA and therefore are not anticipated to cause harmful alteration or destruction of fish or fish habitat.	
Groundwater	✓	✓	• During construction of the power generation facility, the Project has the potential to change groundwater quantity and quality as a result of potential drilling of extraction wells, excavations, and potential dewatering activities, and from accidental spills in areas where groundwater is shallow.	Section 7

Valued Component	Potential Project Interaction	Included in Assessment	Rationale for Inclusion or Exclusion in the EE	Section(s) where addressed in the EE
Soils and Terrain	✓	✓	• Soil handling, grading, and excavations are required for construction of the Project. Topsoil and upper subsoil (and subsoil where excavations are required) will be removed for infrastructure installation, which will be stockpiled and stored in designated areas for reclamation at the end of the Project's operational life. • The Project may cause soil mixing and erosion in the event of improper handling or through extended storage on-site.	Section 8
Vegetation and Wetlands	✓	✓	• During construction, vegetation will be cleared and wetlands will be disturbed. The PDA will be graded and wetlands within it will be lost.	Section 9
Wildlife and Wildlife Habitat	✓	✓	• The Project's construction activities require clearing of vegetation and wetlands which provide habitat for wildlife species. Project construction and operation will cause sensory disturbance which may disrupt wildlife in the area. • Project activities may alter wildlife movement and contribute to mortality risk for wildlife.	Section 10
Environmentally Sensitive Areas	-	-	• The Project is not within any known environmentally sensitive areas. A search of the fish and wildlife mapping tool did not identify any provincial sensitive wildlife or fish habitat within the PDA (GOA 2025a).	-
Historical Resources	✓	-	• The Project is not located on lands with known historical resources. A *Historical Resource Act* approval (4940-25-0046-001) was obtained on July 10, 2025 and stipulates standard requirements for chance find procedures. Therefore, historical resources are not included in this assessment.	-

Notes:

✓ Included in the assessment

- Not included in the assessment

5 Assessment of Potential Effects on Air Quality

The primary substances of interest emitted by the Project are nitrogen oxides (NO_x), carbon monoxide (CO), and fine particulate matter ($PM_{2.5}$). NO_x are produced in most combustion processes and are made up of nitrogen oxide (NO) and nitrogen dioxide (NO_2). The assessment evaluates maximum predicted NO_2, CO, and $PM_{2.5}$ concentrations relative to Alberta Ambient Air Quality Objectives and Guidelines (AAAQO/G; (AEPA 2024a)). Potential effects on ambient air quality were evaluated based on model predictions from the AERMOD dispersion model. Dispersion modelling was performed in accordance with the current AEPA Air Quality Model Guideline (AQMG; (AEP 2021)) and Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022) specific to IH-DIZ.

The Air Quality Assessment completed for the Project is included in Appendix C of the AUC Application.

5.1 Assessment Boundaries

5.1.1 Ambient Air Quality Objectives

Air quality is assessed by comparing measured or predicted concentrations to objectives and standards. AEPA has established AAAQO/G for several substances.

The Project is a source of NO_x, CO, and $PM_{2.5}$. NO_X constituents, include NO_2, which is a respiratory irritant, while NO is relatively inert. As such, regulatory ambient air quality objectives exist for NO_2, and not for NO or NO_x. Table 5.1 presents the relevant AAAQO/G (AEPA 2024a).

Table 5.1 Alberta Ambient Air Quality Objectives

Key Substances of Interest	Averaging Period	AAAQO [a] (µg/m^3)
NO_2	1-hour	300
	Annual	45
CO	1-hour	15,000
	8-hour	6,000
$PM_{2.5}$	1-hour	80 [b]
	24-hour	29

Notes:

[a] Alberta Ambient Air Quality Objectives (AEPA (2024a)) unless otherwise stated.

[b] Alberta Ambient Air Quality Guideline (AEPA (2024a))

Concentrations are in micrograms per cubic metre (µg/m^3) at 25 Celsius and 101.325 Kilopascal

5.1.2 Local and Regional Assessment Area

The Project is located approximately 13 km north of Fort Saskatchewan, Alberta, in the IH-DIZ. A 35 km by 35 km LAA/RAA centered at the Project was selected for the air quality assessment to model the cumulative effects of the Project and other regional industrial facilities within the IH-DIZ. The study area is based on the guidance in the Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022).

Topography within the 35 km 35 km air quality LAA/RAA is shown in Figure 3.1 of the Air Quality Assessment (Appendix I of the AUC application). With the North Saskatchewan River running from southwest to northeast across the air quality LAA/RAA, the terrain slopes downhill along the river, and uphill to the northwest and southeast of the air quality LAA/RAA. The Project is located at a base elevation of 646 m above sea level (asl). Terrain elevations within the study area range from approximately 585 to 730 m asl.

5.1.3 Receptor Grid

Calculations of ground-level air concentrations were made for locations outside the Project boundary according to the AQMG (AEP 2021). A series of nested Cartesian grids with increasing receptor density with proximity to the Project were applied. In total, 6,129 receptors were generated for this assessment. As shown in Figure 5.1 of the Air Quality Assessment (Appendix C of the AUC Application), the receptor grids and their corresponding spacing are as follows:

- 20 m spacing along the Project fenceline
- 20 m spacing within 200 m of the Project fenceline
- 50 m spacing within the 500 m of the Project fenceline
- 250 m spacing within the 2 km of the Project fenceline
- 500 m spacing within the 5 km of the Project fenceline
- 1000 m spacing beyond the 5 km of the Project fenceline

Actual terrain elevations were applied to all receptors used in dispersion modelling based on Canadian Digital Elevation Model (NRCan 2016) terrain elevation data.

5.2 Assessment Approach

Dispersion models are used to predict how given emissions result in observed ground-level concentrations during a variety of meteorological conditions and terrain influences. All modelling conducted for the air quality assessment followed AQMG (AEP 2021) and Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022) specific to IH-DIZ. The maximum predicted air concentration outputs by the dispersion model, including the background concentrations, were assessed through comparison with the applicable ambient air quality objectives and guidelines.

To assess the effects on air quality associated with emissions from the Project, dispersion modelling was conducted for the following scenarios:

- Base Case: includes emissions associated with existing regional facilities in the air quality LAA/RAA (excluding the Project) and ambient background
- Project Case: includes emissions from the Project during operation
- Application Case: includes cumulative emissions from the Project, existing regional facilities, and ambient background

Complete details for each assessment scenario and modelling methodology for the assessment are provided in Appendix C of the AUC application.

5.3 Existing Conditions for Air Quality

The Project is proposed to be located within the Heartland Air Monitoring Partnership (HAMP) airshed (formerly known as Fort Air Partnership (FAP)). The Supplementary Guideline for the Preparation of Air Quality Modelling for Regulatory Applications (AEP 2022) prescribes the representative monitoring stations in the IH-DIZ for the determination of baseline concentrations. The prescribed ambient air quality monitoring station for NO_2 and $PM_{2.5}$ is the Gibbons station and for CO is the Fort Saskatchewan station which are part of the HAMP/FAP.

The data representing the most recent three years (2022 to 2024) with a complete data record were analyzed in accordance with the AQMG (AEP 2021) 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 background ambient air concentrations for the study area are summarized and compared to the AAAQO in Table 5.2.

Table 5.2 Ambient Background Concentration

Station	Species	Averaging Period	Background Concentration [a b] (µg/m^3)	AAAQO/G (µg/m^3)	Percent of Applicable AAAQO/G
Gibbons	NO_2	1-hour	31.9	300	10.6
		Annual	9.8	45	21.8
Fort Saskatchewan	CO	1-hour	380	15,000	2.5
		8-hour	379	6,000	6.3
Gibbons	$PM_{2.5}$ [c]	1-hour	17.2	80	21.5
		24-hour	16.7	29	57.7

Notes:

[a] 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.

5.3.1 Local Emissions Sources

As recommended by the AQMG (AEP 2021), nearby industrial emission sources in the air quality LAA/RAA have been included in dispersion modelling. Based on a search of the most recent Alberta Annual Emissions Inventory Reporting, the Environment and Climate Change Canada (ECCC) National Pollutant Release Inventory database, and provincial EPEA Approvals, it was determined that there are 45 existing and approved major sources of emissions located in the air quality LAA/RAA.

For more details on these emission sources, see Section 4.2 of the Air Quality Assessment (Appendix C of the AUC application).

5.4 Potential Project Effects and Pathways

Potential effects, effect pathways, and the measurable parameters used to characterize and assess effects on air quality are provided in Table 5.3.

Table 5.3 Potential Effects, Pathways and Measurable Parameters for Air Quality

Potential Effect	Effect Pathways	Measurable Parameter(s) and Units of Measurement
Change in ambient air quality	• Change in ambient air quality during construction • Change in ambient air quality during operation	• Exceedance of AAAQO in comparison to predicted ambient ground level concentrations (µg/m^3)

5.5 Project Interactions with Air Quality

Table 5.4 identifies which Project activities have the potential to result in effects to air quality. These interactions are indicated by check marks. A justification is also provided for non-interactions (no check marks).

Table 5.4 Potential Project Interactions and Effects on Air Quality

Project Activity	Potential Effects
	Changes in Ambient Air Quality
Construction	✓
Operation	✓

Notes:

✓ Potential interactions that might cause an effect.

\- Interactions between the Project and the VC are not expected

5.5.1 Project Case Results

Dispersion modelling for the Project Case includes emissions from the four gas turbine generators plus the HRSGs. All combustion equipment is assumed to operate continuously at maximum rated capacity with all exhaust exiting through the HRSG stacks. The maximum predicted concentrations, without background, are summarized in Table 5.5.

The air quality assessment shows that maximum predicted ground-level concentrations for all substances of interest associated with emissions from the Project operation (the Project alone) are well below the AAAQO/G for all relevant averaging periods (ranging between 0.1% and 15% of the AAAQO/G)

Table 5.5 Predicted Ground-level Concentrations (µg/m^3) Associated with the Project Case

Substance	Averaging Period	Maximum Predicted Ground-Level Concentrations (µg/m^3)	AAAQO (µg/m^3)	Comparison of Predictions to AAAQO (%)
NO_2 (TCM) [a]	1-hour [b]	29.2	NA	NA
	Annual	0.840	NA	NA
NO_2 (ARM2) [c]	1-hour [b]	26.3	300	9%
	Annual	0.757	45	2%
CO	1-hour [b]	18.4	15,000	0.1%
	8-hour	16.0	6,000	0.3%
$PM_{2.5}$	1-hour [b]	10.6	80	13%
	24-hour	4.46	29	15%

Notes:

[a] 100% of the NO_X concentrations are converted to NO_2 (Total Conversion Method (TCM)).

[b] 9th highest predictions (AEP 2021).

[c] NO_X was converted to NO_2 using the ARM2.

NA – Not Applicable

5.6 Mitigation

Standard industry practices and avoidance measures, along with specific mitigation, will be implemented during construction and operation of the Project to reduce or eliminate environmental effects on ambient air quality.

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

Table 5.6 identifies mitigation measures that will be implemented to reduce potential adverse effects of the Project on ambient air quality.

Table 5.6 Mitigation Measures for Air Quality

Potential Effect	Effect Pathway	Proposed Mitigation Measures
Changes in Ambient Air Quality	• Changes to ambient air quality during construction activities	• Vehicles and equipment will be required to meet emission control standards including the on-Road Vehicle and Engine Emission Regulations and the Off-road Compression-Ignition (Mobile and Stationary) and Large Spark-Ignition Engine Emission Regulations. • The concentration of sulphur in diesel fuel will not exceed 15 mg/kg to comply with Sulphur in Diesel Fuel Regulations. • Construction vehicle idling times will be reduced to the extent possible to reduce emissions, as a best management practice. • Equipment and vehicles will be maintained in good working order with functioning mufflers and emission control systems as available • When appropriate, contractors will be required to provide properly working machinery and equipment with adequate noise suppression devices that meet current government requirements • As deemed appropriate by GECGP, records of vehicle maintenance will be retained and made available by the contractor for periodic review by GECGP • All work will be conducted in a manner that reduces the raising of dust from construction or maintenance operation. • Dust control measures such as watering roads to suppress dust distribution and ceasing operation during periods of high winds will mitigate the distribution of particulate matter during construction activities.

Potential Effect	Effect Pathway	Proposed Mitigation Measures
Changes in Ambient Air Quality (cont'd)	Continued from above	• As appropriate, cover or otherwise contain loose materials that have potential to release airborne particulates during their transport, installation, or removal • As necessary, use water mist or calcium chloride dust suppressant on the work sites (calcium chloride will not be used on natural areas; only to be used on graveled access roads only) • As appropriate, protect stockpiles of friable material with a barrier, windscreen, or quick growing vegetation • Surfaces of temporary soil and overburden stockpiles will be stabilized during extended periods between usage, by means of vegetating or covering the exposed surfaces.
	• Changes in ambient air quality during operation	• Adhere to federal emission standards and guidelines for new turbine emissions (Environment and Climate Change Canada, [2017] Guidelines for the Reduction of Nitrogen Oxide) • Emissions from Natural Gas-fuelled Stationary Combustion Turbines. • Regular inspection and maintenance of the CCGT to maintain performance and reduce emissions. • Meet ambient air quality objectives, and industry standard best practices for operational emissions. • Regular inspection and maintenance of the gas turbines to ensure optimum performance and reduce emissions. • Construction equipment and vehicles will be maintained to the appropriate code or industry best practice. • All effort will be made to reduce the idling of construction equipment and vehicles.

5.7 Assessment of Residual Effects on Air Quality

5.7.1 Residual Effects Description Criteria

Criteria used to assess residual effects on air quality are provided in Table 5.7.

Table 5.7 Characterisation of Residual Effects on Air Quality

Potential Effect	Effect Pathway
Direction	• **Positive** – an effect that moves measurable parameters in a direction beneficial to the atmospheric environment relative to baseline. A decrease in air contaminants emissions (including predicted ambient concentrations) compared to baseline conditions. • **Adverse** – an effect that moves measurable parameters in a direction detrimental to the atmospheric environment relative to baseline. An increase in air contaminants emissions (including predicted ambient concentrations) compared to baseline conditions. • **Neutral** - no net change in air contaminants emissions from baseline conditions
Magnitude	• **Negligible** – no measurable change • **Low** – a measurable change in CACs but within normal variability of baseline conditions. • **Moderate** – increase in CACs with regard to baseline but within regulatory levels and objectives. • **High** – singly or as a substantial contribution in CACs in combination with other sources causing exceedances of objectives beyond the Project boundaries.
Geographic extent	• **PDA** - residual effect limited to the PDA • **LAA/RAA** - residual effects extend into the Air Quality LAA/RAA
Duration	• **Short-term** - residual effect will occur only during Project construction • **Medium-term** - residual effect extends through the operating life of the Project (e.g., operation phase). • **Long-term** - residual effect extends longer than operation
Frequency	• **Single event** • **Multiple irregular event** – occurs at no net schedule • **Multiple regular event** – occurs at regular intervals • **Continuous** – occurs continuously
Reversibility	• **Reversible** – the effect is likely to be reversed after activity completion and reclamation • **Irreversible** – the effect is unlikely to be reversed
Ecological and socio-economic context	• **Undisturbed** – area is relatively undisturbed or not adversely affected by human activity • **Disturbed** – area has been substantially previously disturbed by human development or human development is still present

5.7.2 Change In Ambient Air Quality

5.7.2.1 Construction

Project interactions with Air Quality during construction are expected to be of low magnitude and short-term and localized to the LAA/RAA as the only source of criteria air contaminants (CACs) are from Project vehicles and equipment used during construction, including dust. The frequency of residual effects will be continuous for the duration of the construction and are considered reversible. Construction phase air emissions will be addressed through codified practices, proven effective mitigation measures, and best management practices. Standard mitigation measures include maintaining vehicles, reducing idling of equipment, and using dust control measures. Standard mitigations measures for construction emissions are available in Table 5.6 and the Project EPP (available in Appendix F of the AUC Application).

5.7.2.2 Operation

Dispersion modelling for the Application Case includes emissions from the Project and the existing regional emission facilities. The existing regional emission facilities were modelled as Base Case. The maximum predicted NO_2 concentrations for 1-hour and annual averaging period associated with Base Case, including background, are 178 µg/m^3 and 28.2 µg/m^3, respectively. The maximum predicted CO concentrations for 1-hour and 8-hour averaging periods associated with Base Case, including, background, are 1,798 µg/m^3 and 1,480 µg/m^3, respectively. The maximum predicted NO_2 and CO concentrations for all averaging periods associated with the Base Case are below the AAAQO.

The maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations associated with the Base Case, including background, are 142 µg/m^3 and 70.3 µg/m^3, respectively, and are greater than the relevant AAAQO/G. The maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations associated with Base Case occur approximately 12 km south of the Project boundary near the Chemtrade facilities and 14.4 km south-southwest of the Project boundary near the Bunge Canada oil processing plant, respectively.

Residual effects on ambient air quality during operation are predicted to be adverse. Residual effects during operation will be localized to the LAA/RAA, moderate in magnitude, and medium term in duration. The frequency of residual effects will be continuous for the lifetime of the Project and are considered reversible.

The maximum predicted concentrations associated with Application Case, including background, are summarized in Table 5.8.

Table 5.8 Maximum Predicted Ground-level Concentrations (µg/m³) Associated with the Application Case

Substance	Averaging Period	Maximum Predicted Ground-Level Concentrations (µg/m³)	Ambient Background Concentration (µg/m³)	Maximum Predicted Concentration Including Background (µg/m³)	AAAQO (µg/m³)	Comparison of Predictions to AAAQO (%)	Percent Increase from Base Case (%)
NO_2 (TCM) [a]	1-hour [b]	452	31.9	484	NA	NA	NA
	Annual	22.2	9.8	32.0	NA	NA	NA
NO_2 (ARM2) [c]	1-hour [b]	151	31.9	183	300	61%	2.5%
	Annual	18.5	9.8	28.3	45	63%	0.3%
CO	1-hour [b]	1,418	380	1,798	15,000	12%	0.005%
	8-hour	1,102	379	1,481	6,000	25%	0.05%
$PM_{2.5}$	1-hour [b]	124	17.2	**142**	80	177%	0.0%
	24-hour	53.6	16.7	**70.3**	29	242%	0.0003%

Notes:

[a] 100% of the NO_X concentrations are converted to NO_2 (TCM).

[b] 9th highest predictions (AEP 2021).

[c] NO_X was converted to NO_2 using the ARM2.

Bold text indicates exceedance of AAAQO/G.

TCM NO_2 concentrations not bolded as ARM2 values less than AAAQO.

5.7.2.3 NO_2 Predictions

The maximum predicted 1-hour and annual average ground-level NO_2 concentrations associated with the Application Case are 183 µg/m³ and 28.3 µg/m³, respectively, including background. All maximum predicted NO_2 concentrations are less than the relevant AAAQO/G. The 1-hour and annual NO_2 concentrations increased by 2.5% and 0.3%, respectively, compared to the Base case predicted concentrations.

The maximum predicted 1-hour NO_2 concentrations occur 10 km east-northeast of Project boundary, east of the Nutrien Redwater fertilizer plant. The maximum predicted annual NO_2 concentrations occur 9.5 km south-southeast of Project boundary adjacent to Dow Chemical facility, respectively, as shown Figures C.13 and C.14 in Appendix I of the AUC application.

5.7.2.4 CO Predictions

The maximum predicted 1-hour, and 8-hour average ground-level CO concentrations associated with the Application Case are 1,798 µg/m^3 and 1,481 µg/m^3, respectively, including background. All maximum predicted CO concentrations are less than the relevant AAAQO/G. The 1-hour and annual CO concentrations increased by less than or equal to 0.05% compared to the Base Case predicted concentrations.

The maximum predicted 1-hour and 8-hour CO concentrations occur 4.8 km east-northeast of the Project boundary adjacent to the North West Sturgeon refinery and 5.1 km east of the Project boundary adjacent to Nutrien Redwater fertilizer facility, respectively, as shown in Figures C.15 and C.16 in Appendix I of the AUC application.

5.7.2.5 $PM_{2.5}$ Predictions

The maximum predicted 1-hour and 24-hour average ground-level $PM_{2.5}$ concentrations associated with the Application Case are 142 µg/m^3 and 70.3 µg/m^3, respectively, including background. Maximum predicted $PM_{2.5}$ concentrations are greater than the relevant AAAQO/G. The 1-hour and 24-hour $PM_{2.5}$ concentrations increased by less or equal to 0.0003% relative to the Base Case predicted concentrations.

The maximum predicted 1-hour and 24-hour $PM_{2.5}$ concentrations occur approximately 12 km south of the Project boundary near the Chemtrade facilities and 14.4 km south-southwest of the Project boundary near the Bunge Canada oil processing plant, respectively, as shown in Figures C.17 and C.18 in Appendix I of the AUC application.

5.7.3 Summary Of Residual Effects on Air Quality

Residual effects of the Project on the air quality are summarized in Table 5.9. For more details on the scenarios and results, refer to Appendix I of the AUC application.

Table 5.9 Residual Effects on Air Quality

Residual Effect	Residual Effects Characterization						
	Direction	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Ecological and Socio-economic Context**
Change in air quality and quantity							
Construction	A	L	LAA/RAA	ST	C	R	D
Operation	A	M	LAA/RAA	MT	C	R	D

KEY

Refer to Table 5.7 for detailed definitions

Direction

P Positive
A Adverse
N Neutral

Magnitude

N Negligible
L Low
M Moderate
H High

Geographic Extent

PDA Project Development Area
LAA Local Assessment Area
RAA Regional Assessment Area

Duration

ST Short-term
MT Medium-term
LT Long-term

N/A Not applicable

Frequency

S Single event
IR Multiple irregular event
R Multiple regular event
C Continuous

Reversibility

R Reversible
I Irreversible

Ecological and Socio-economic Context

U Undisturbed
D Disturbed

5.8 Significance Determination

A significant residual effect for air quality is defined by the AEPA established AAAQO. As per the AAAQO, the predicted ground-level concentrations associated with the Project are required to be less than the AAAQO on and outside of the fenceline where public access is not restricted.

The dispersion modelling shows that the maximum predicted concentrations for NO_2, CO, and $PM_{2.5}$ associated with the Project alone are less than the AAAQO.

Comparison between maximum predicted concentrations for the Base Case and Application Case indicates small increases (0.0003% to 2.5%) to the maximum predicted NO2, CO, and $PM_{2.5}$ concentrations with the addition of the Project. The model results show that overall maximum concentrations in the study area, including predicted exceedances of the AAAQO/G for $PM_{2.5}$ for the Base and Application Case, are primarily attributable to emissions from the existing regional industrial facilities.

With the application of recommended mitigation measures, residual environmental effects from the Project on Air Quality are predicted to be not significant.

6 Assessment of Potential Effects on the Acoustic Environment

A noise impact assessment (NIA) has been completed for the Project. The purpose of the NIA was to quantify the Project's noise contribution during normal operation within the LAA and RAA. The results of the NIA were compared to the requirements under AUC Rule 012: Noise Control (AUC Rule 012) in support of the regulatory approval process (AUC 2024b).

The complete results of the NIA completed for the Project are included in Appendix H of the AUC Application.

6.1 Assessment Boundaries

6.1.1 Local and Regional Noise Assessment Area

The noise LAA is defined by a 1.5 km buffer area from the PDA boundary. The noise LAA boundary also represents the AUC 1.5 km criteria boundary.

The noise RAA is defined as the area which may be affected by environmental noise emissions from the Project. The noise RAA extends 3 km from the PDA boundary to encompass noise effects from the Project as well as other AUC and Alberta Energy Regulator (AER) regulated facilities.

6.1.2 Noise Receptor

One noise receptor (R1) was identified within the 1.5 km noise LAA boundary. The receptor ID, location, and distance to the Project are presented in table below.

Table 6.1 Noise Receptor Location

Receptor ID	Description	Universal Transverse Mercator (UTM) Coordinates [1] (m)		Approximate Distance (m) and direction from Project
		Easting	Northing	
R1	Residential Dwelling approximately 380 m north from Highway 643	355362	5967524	860 northwest

Note:

[1] UTM Zone 12U NAD 83

6.2 Assessment Approach

The assessment considered three cases as follows:

- Baseline Case: includes the noise effect from the ambient sound level (ASL) and other third-party regulated (i.e., AUC or AER) existing energy related facilities, approved but not yet constructed energy-related facilities, and proposed energy-related facilities that have been deemed complete under applications.
- Project Case: includes noise effect from the Project only.
- Application Case: assesses the cumulative noise effect including the contribution from the Baseline Case and the Project Case. The Application Case cumulative sound level results are compared to the Permissible Sound Levels (PSLs) to verify compliance with the AUC Rule 012 requirements.

The approach used to assess the potential noise effects during normal operation of the Project is consistent with the AUC Rule 012 requirements. The approach is summarized as follows:

- Determine ASL and PSLs for receptor location(s) within the noise LAA.
- Quantify the Baseline Case sound levels.
- Predict the Project Case sound level representing the noise effect from the Project only.
- Determine the Application Case sound level by combining the noise effects from the Baseline Case and Project Case.
- Assess compliance with the AUC Rule 012 requirements by comparing the Application Case cumulative sound level at the receptor to the PSL.

6.2.1 PSL

R1 is located at approximately 380 m north from Highway 643 - a heavily travelled road. The PSLs at receptor R1 are determined according to AUC Rule 012 and summarized in Table 6.2 below.

Table 6.2 Permissible Sound Levels

Receptor ID	**Permissible Sound Levels (dBA)**	
	Daytime	**Nighttime**
R1	55	45

6.2.2 Noise Modelling

Noise emission modelling was conducted using Cadna/A acoustic modeling software (DataKustik 2025), based on internationally accepted sound propagation algorithms (ISO 1993, 1996). These standards are commonly used by noise practitioners and are accepted by the AUC.

Further details on the modelling parameters used in the assessment are provided in Section 4.3 of the NIA (Appendix H of the main AUC Application).

6.3 Existing Conditions for the Acoustic Environment

6.3.1 Ambient Sound Level

The ASLs are determined by methods prescribed in AUC Rule 012. AUC Rule 012 assumes the nighttime ASLs to be 5 dB less than Basic Sound Levels (BSLs) for the receptor. The ASLs for the receptor R1 are presented in Table 6.3.

Table 6.3 Ambient Sound Level (ASL) at Receptor

Receptor ID	Nighttime BSL (dBA)	Ambient Sound Level (dBA)	
		Daytime L_{eq}	Nighttime L_{eq}
R1	45	50	40

6.3.2 Third Party Facility Noise Effects

The Project is in the IH-DIZ. Environmental noise effects of the regulated facilities within the IH-DIZ need to comply with the AER Directive 038 Noise Control (Directive 038) and AUC Rule 012 with consideration of the Northeast Capital Industrial Association's (NCIA) Regional Noise Management Plan (RNMP). The RNMP provides a regional approach for managing environmental noise from industrial activities and is the regional solution for NCIA member companies to comply with the AUC and AER noise regulations.

The Regional Noise Model (RNM), developed following the RNMP, is an online tool showing the baseline noise contours in the IH-DIZ region. The latest baseline noise contour results were published in 2024, which covers the 2022 and 2023 calendar years. Case 2: Future Case of the RNM includes the existing energy-related facilities, approved but not yet constructed energy-related facilities, and proposed energy-related facilities expected to be constructed within 1-5 years; and was used to determine the noise contributions from the existing energy-related facilities, approved and proposed energy-related facilities in the IIH-DIZ area.

Stantec obtained the "gridmap" from NCIA on behalf of GECGP. The "gridmap" results of RNM Case 2 are imported into the CadnaA noise model to determine the sound levels at the receptors within the assessment area. The predicted daytime and nighttime sound levels at receptor R1 are presented in Table 6.4.

Table 6.4 NCIA RNM Results

Receptor ID	Daytime or Nighttime L_{eq} (dBA)
R1	33.9

6.3.3 Baseline Case Results

The Baseline Case sound levels are the combined sound levels of the ASL and NCIA RNM results. Table 6.5 summarizes the results at R1. The results show that Baseline Case sound levels at the receptor are below the PSLs.

Table 6.5 Baseline Case Results

Receptor ID	Ambient Sound Level (dBA)		NCIA RNM Results (dBA)		Baseline Case Sound Level (dBA)		PSL (dBA)	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	50	40	33.9	33.9	50.1	41.0	55	45

6.4 Project Effects and Pathways

The primary focus of the acoustic environment component of this assessment is PSLs at the receptor (R1) (as defined in Section 6.2.1). Potential effects, effect pathways, and the measurable parameters used to characterize and assess effects on the acoustic environment are provided in Table 6.6 below. Further details on the modelling parameters used in the assessment are provided in Section 4.3 of the NIA (Appendix H of the main AUC Application).

Table 6.6 Potential Effects, Pathways and Measurable Parameters for Acoustic Environment

Potential Effect	Effect Pathways	Measurable Parameter(s) and Units of Measurement
Change in existing acoustic environment	• Change in cumulative noise levels during construction • Change in cumulative noise levels during operation	• Daytime equivalent sound level, Ld (dBA) • Nighttime equivalent sound level, Ln (dBA)

6.5 Project Interactions with the Acoustic Environment

Table 6.7 identifies which Project interactions have the potential to result in effects to the acoustic environment. These interactions are indicated by check marks the context of effects pathways, standard and Project specific mitigation, and residual effects.

Table 6.7 Potential Project Interactions and Effects on the Acoustic Environment

Project Activity	**Potential Effects**
	Change in existing acoustic environment
Construction	✓
Operation	✓

Notes:

✓ Potential interactions that might cause an effect.

- Interactions between the Project and the VC are not expected

6.5.1 Project Case Results

The Project Case represents the noise effect from the Project. Appendix H of the AUC Application includes a NIA report with detailed description of the predicted Project noise emissions during the operation phase of the Project.

Table 6.8 summarizes the predicted Project case noise effect at the receptor R1. The results include the mitigation measures presented in Section 6.6. The model assumes all equipment is operating continuously during both the daytime and nighttime periods; therefore, prediction results are the same for both periods.

Table 6.8 Project Noise Effect

Receptor ID	**Project Case Noise Level (dBA)**	
	Daytime	**Nighttime**
R1	38.9	38.9

Table 6.9 presents the predicted Project Case A-weighted and C-weighted sound levels at R1. Results in Table 6.9 show that the dBC minus dBA values are below 20 decibels (dB) at R1. Therefore, this assessment concludes that there is low potential for low frequence noise (LFN) effect at the residential receptor R1 based on AUC Rule 012.

Table 6.9 Low Frequency Noise Analysis

Receptor ID	Predicted Daytime and Nighttime Project Only Sound Level		dBC minus dBA (dB)	Equal to or Greater than 20 dB?
	A-Weighted (dBA)	C-Weighted (dBC)		
R1	38.9	58.4	19.5	No

6.6 Mitigation

Standard industry practices and avoidance measures, along with specific mitigation, will be implemented during construction and operation of the Project to reduce or eliminate environmental effects on the acoustic environment.

Table 6.10 identifies mitigation measures that will be implemented to reduce potential adverse effects of the Project on the acoustic environment.

Table 6.10 Mitigation Measures for Acoustic Environment

Potential Effects	Effect Pathway	Mitigation
Change in existing sound levels that may cause noise annoyance	Change in cumulative noise levels during construction	• Construction will take place during regular construction hours (to be determined upon start of Project construction) with extended hours as necessary with permission from the municipality and GECGP. • Check that noise abatement equipment on vehicles and machinery is maintained in good working order. • Reduce vehicle and equipment idling. • Siting construction staging and workspace to avoid or reduce adverse impact to sensitive receptors where possible. • Install equipment enclosures for equipment such generators and compressors. • Reduce simultaneous operation of heavy equipment where possible (e.g., jackhammer and vacuum excavator). • Reroute construction and truck traffic, when possible. • Residents near to high noise generating activities (e.g., pile driving) will be notified prior to construction. • A complaint response procedure will be implemented to address noise complaints should they arise.

Potential Effects	Effect Pathway	Mitigation
Change in existing sound levels that may cause noise annoyance (cont'd)	Change in cumulative noise levels during operation	• See Section 6.2 of Appendix C of the main AUC application for further equipment mitigation measures required to meet the PSL for Application Case. • Install a 4" thick envelope with 24ga exterior cladding, high density mineral wool insulation, and a perforated inside liner on Turbine buildings to meet a sound transmission class (STC) 30 or above. • Incorporating noise attenuation measures on the air-cooled condenser during design to meet acoustic performance specified in NIA. This may include, but is not limited to, reducing fan speed, and using low-noise fan blades. • Equipment and vehicles will be maintained in good working order with functioning mufflers and emission control systems as available.

6.7 Assessment of Residual Effects on the Acoustic Environment

6.7.1 Residual Effects Description Criteria

Criteria used to assess residual effects on the acoustic environment are provided in Table 6.11.

Table 6.11 Characterization of Residual Effects on Acoustic Environment

Characterization	Quantitative Measure or Definition of Qualitative Categories
Direction	**Positive** – The acoustic environment in the LAA is improving in comparison to ambient conditions **Adverse** – The acoustic environment in the LAA is worsening in comparison to ambient conditions **Neutral** – No net change in the acoustic environment within the LAA
Magnitude	**Low** – Project noise level at receptors meets the AUC Rule 012 noise guideline requirements **High** – Project noise level at receptors does not meet the AUC Rule 012 noise guideline requirements
Geographic extent	**PDA** – residual effects are restricted to the PDA **LAA** – residual effects extend into the LAA **RAA** – residual effects interact with those of other projects in the RAA
Duration	**Short-term** – residual effect is restricted to construction **Medium-term** – residual effect extends through construction and through the life of the Project **Long-term** – residual effect extends beyond the life of the Project

Characterization	Quantitative Measure or Definition of Qualitative Categories
Frequency	**Single event** **Multiple irregular event** – occurs at no set schedule **Multiple regular event** – occurs at regular intervals **Continuous** – occurs continuously
Reversibility	**Reversible** – the effect is likely to be reversed after activity completion and reclamation **Irreversible** – the effect is unlikely to be reversed
Ecological and socio-economic context	**Undisturbed** – area is relatively undisturbed or not adversely affected by human activity **Disturbed** – area has been substantially previously disturbed by human development or human development is still present

6.7.2 Change In Acoustic Environment

6.7.2.1 Construction

Project construction noise will occur during construction activities such as: site preparation and the use of construction equipment for grading, pile driving, excavations, concrete pouring, and steel and component installation. Residual construction noise effects during construction are predicted to be low in magnitude, extend within the noise LAA, be short-term for the operational life of the Project, occur continuously and are reversible following completion of construction.

AUC Rule 012 does not set noise limits for construction activities; however, measures will be implemented to reduce noise effects from these activities (see Section 6.6 for proposed mitigation measures). Therefore, construction phase effects are not assessed in further detail.

6.7.2.2 Operation

The Application Case results are compared to the PSLs of AUC Rule 012. The Application Case determines the cumulative sound levels by combining the Project Case and Baseline Case sound levels together. These results are compared to the PSLs to verify the Project's status of compliance.

Table 6.12 summarizes the cumulative sound level at R1. The results indicate that cumulative sound levels are below the PSLs at the receptor. For more details on the scenarios and results, refer to Appendix H of the AUC Application.

Table 6.12 Application Case Results

Receptor	Project Case Level (dBA)		Baseline Case Level (dBA)		Cumulative Sound Level (dBA)		Permissible Sound Level (dBA)		Below PSLs?
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	
R1	38.9	38.9	50.1	41.0	50.4	43.1	55	45	Yes

Residual effects for changes in the acoustic environment are expected to be neutral during operation. Residual effects during operation are predicted to be low in magnitude, extend within the noise LAA, be medium-term for the operational life of the Project, occur continuously and are reversible following final decommissioning at the end of Project life. Residual effects of the Project on the acoustic environment are summarized in Table 6.13. For more details on the scenarios and results, refer to Appendix H of the AUC Application.

6.7.3 Summary of Residual Effects on the Acoustic Environment

Residual effects of the Project on the acoustic environment are summarized in Table 6.13. For more details on the scenarios and results, refer to Appendix H of the AUC application.

Table 6.13 Residual Project Effects on Acoustic Environment

Residual Effect	Residual Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological and Socio-economic Context
Change in acoustic environment							
Construction	N	L	LAA	ST	C	R	D
Operation	N	L	LAA	MT	C	R	D

KEY

Refer to Table 6.11 for detailed definitions

Direction

P Positive
A Adverse
N Neutral

Magnitude

N Negligible
L Low
M Moderate
H High

Geographic Extent

PDA Project Development Area
LAA Local Assessment Area
RAA Regional Assessment Area

Duration

ST Short-term
MT Medium-term
LT Long-term

Frequency

S Single event
IR Multiple irregular event
R Multiple regular event
C Continuous

Reversibility

R Reversible
I Irreversible

Ecological and Socio-economic Context

U Undisturbed
D Disturbed

6.8 Significance Determination

The NIA has predicted that the cumulative sound levels are below the daytime and nighttime PSLs at the receptor R1. LFN was assessed using AUC Rule 012, there is low potential for LFN effect at R1. The assessment finds that the Project is expected to meet the requirements of AUC Rule 012 based on the following observations:

- The cumulative sound levels are below the PSLs at the receptor R1 within 1.5 km of the PDA and within 3 km
- There is low potential for a low-frequency noise effect at the residential receptor R1

With the application of recommended mitigation measures, residual environmental effects from the Project on the acoustic environment are predicted to be not significant.

7 Assessment of Potential Effects on Groundwater

A Phase 1 and Phase 2 Environmental Site Assessment was completed for the PDA to determine baseline groundwater conditions and identify existing contamination. Results of the Phase 1, Phase 2 and desktop assessments used to determine existing groundwater conditions are described in Section 7.3.

The Phase 1 and Phase 2 Environmental Site Assessment can be made available upon request.

7.1 Assessment Boundaries

The groundwater LAA is defined by a 100 m buffer area from the PDA boundary. The groundwater LAA boundary represents local groundwater conditions within the PDA.

The groundwater RAA is defined as the PDA and 1 km from the PDA boundary to encompass groundwater impacts from the Project and incorporate water wells within the groundwater RAA. The groundwater RAA was selected based on available groundwater well data and professional judgment based on experience with similar projects elsewhere and other projects and activities around the Project.

7.2 Assessment Approach

Groundwater was assessed within the groundwater LAA and RAA and considered the following:

- Alberta Water Well Information Database (AEPA 2025)
- Hydrogeology of the Edmonton area, (northeast segment) (Stien 1976)
- Phase 1 Environmental Site Assessment (Stantec 2023a)
- Phase 2 Limited Environmental Site Assessment (Stantec (2023b)

7.3 Existing Conditions for Groundwater

The PDA generally consists of unconsolidated sediments of clay, till, and/or sand underlain by the Wapati and Belly River Formations consisting of sandstone, siltstone, and mudstone. The groundwater yield capacity at the PDA is mapped at approximately 7 – 33 m^3/day (1 – 5 imperial gallons per minute [igpm]) (Stein 1976) and is assumed to be within interbedded shale and sandstone units.

The Alberta Water Well Information Database was queried for the location of documented springs and shallow water well records in the groundwater LAA and RAA, including wells reported as municipal, domestic and springs (AEPA 2025). The water well review takes into account the accuracy of the well record location information, which is often limited because of how location information is recorded[1]. The drilling reports from the water well records were reviewed to identify relevant hydrogeological conditions, such as depth to the static water level, local geology, hydrogeology, and high-yield water wells. A conservative approach was used for this evaluation, by defining shallow water wells as those with borehole depth equal to or less than 30 metres below ground surface (mbgs), or where the completion depth was unknown.

A search of the Alberta Water Well Information Database (AEPA 2025) showed no shallow water well records within the groundwater LAA (areas within 100 m of the PDA) and five shallow water well records within the RAA (areas within 1 km of the PDA), located to the west of the PDA. Locations of identified water well records were not field verified. The five shallow water well records within the RAA have a reported use of domestic (4) and domestic and stock (1) purposes. The completion depths range from approximately 10.36 mbgs (Well ID 157044) to 21.34 mbgs (Well ID 264087). No shallow municipal water well records were identified in the groundwater RAA.

The unconsolidated sediments (clay, sandy clay, till, and/or sand) thickness in the vicinity of the Project area generally ranges from approximately 1.5 – 9.1 m; however, certain areas reported clay, clay and rocks, sand, and/or sand and rocks to a maximum depth of 48.8 m (AEPA 2025). In the area of the Project, there are thinner more permeable unconsolidated sediments (eolian) on top of bedrock compared to other areas. Stein (1976) notes that in the area of PDA, the significant portion covered by eolian deposits results in an area of increased infiltration and net recharge to bedrock aquifers, specifically the Belly River Formation.

Groundwater flow patterns in the area around the Project are expected to be topographically driven from regional topographic highs to regional hydrological drainage features including the North Saskatchewan, Sturgeon and Redwater Rivers. One shallow water well record within the RAA reported a groundwater level of 2.7 mbgs (Well ID 264223) (AEPA 2025). Groundwater is predominately found in the sandstone bedrock; however, localized perched aquifers in the unconsolidated deposits is likely to be present (Stein 1976).

A Phase 1 ESA and a limited Phase 2 ESA (see Appendix F of the AUC application) has been completed for the PDA. Seven boreholes (BH23-01, BH23-02, MW23-03 through MW23-07) were advanced at the PDA on June 5 and 6, 2023. Five of the boreholes (MW23-03 through MW23-07) were completed as groundwater monitoring wells (Stantec 2023b).

[1] The location accuracy of the water well record locations referenced within the database are limited by whether the water well record coordinates are referenced within the database by specific GPS coordinates, or spatially referenced to the centre of the legal sub-division (approximately ± 200 m to 282 m), to the centre of the quarter-section (approximately ± 400 m to 565 m), or to the centre of the section (approximately ± 800 m to 1,130 m).

With the exceptions of certain dissolved metals (manganese, nickel, sodium, and uranium), analyses of groundwater samples collected on July 18 and 19, 2023 indicated that concentrations of Benzene, Toluene, Ethylbenzene, and Xylene, petroleum hydrocarbons F1 to F2, polycyclic aromatic hydrocarbons, dissolved metals, and volatile organic compounds in all samples analyzed were below the laboratory detection limits or below the referenced AEPA 2022 Tier 1 Guidelines with the following expectations (Stantec 2023b):

- The soil SAR at BH23-02 from 1.75 to 2.0 metres below ground surface exceeded the “good” soil rating
- The dissolved metals and total coliform exceedances in groundwater (MW23-03 and MW23-05, respectively) are likely naturally occurring as there are no indications of other potential sources of contamination at or around the PDA

7.4 Potential Effects and Pathways

Potential effects, effect pathways and the measurable parameters used to characterize and assess effects on groundwater are provided in Table 7.1.

Table 7.1 Potential Effects, Pathways and Measurable Parameters for Groundwater

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in groundwater quality or quantity	Alteration of shallow groundwater levels or flow rates in nearby water wells or springs through dewatering	• Reduced production or static water level in the immediate vicinity of dewatering within nearby water well(s)
	Disturbance of pre-existing contamination (if discovered)	• Metres cubed of existing contamination detected and/or remediated
	Accidental spills	• Litres of spill material released

7.5 Project Interactions with Groundwater

Table 7.2 identifies which Project interactions have the potential to result in effects on groundwater. Potential interactions are indicated by check marks and a justification is also provided for non-interactions (no check marks).

Table 7.2 Potential Project Interactions and Effects on Groundwater

Project Activity	**Potential Effect**
	Change in groundwater quality or quantity
Construction	✓
Operation	-

Notes:

✓ Potential interactions that might cause an effect.

- Interactions between the Project and the VC are not expected.

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

7.6 Mitigation

Standard industry practices and avoidance measures will be implemented during construction of the Project to reduce or eliminate environmental effects on groundwater.

Table 7.3 identifies mitigation measures that will be implemented to reduce potential adverse effects of the Project on groundwater.

Table 7.3 Mitigation Measures for Effects on Groundwater

Potential Effect	Effect Pathway	Proposed Mitigation Measures
Change in groundwater quality or quantity	• Alteration of shallow groundwater levels or flow rates in nearby water wells or springs through dewatering	• Limit the amount of time that a trench /excavation is left open and the duration of dewatering events • Dewatering will not be done in a location where it will re-enter an excavation • Hoses and pumps will be of sufficient length and capacity to transfer water to the desired location and will be in good working condition; hoses with tears or ruptures will be repaired or replaced • The outlet location will be protected to prevent erosion and will be regularly monitored to reduce the potential for a release of deleterious substances • Monitor water levels in all open excavations. • Discharge water away from drainage courses, waterbodies and wetlands; appropriate locations for discharge will be identified during construction by the Contractor(s) or Qualified Professional. • Monitor the water discharge site for signs of erosion, saturation of the discharge site or flow off of the approved release area. Suspend dewatering and apply erosion control measures, reduce the flow or move the discharge site if it appears that the above effects are occurring.
	• Disturbance of pre-existing contamination (if discovered)	• If contaminated or potentially contaminated soil or water is encountered, implement contamination management and contingency plans.
	• Accidental spills	• Develop and implement a spill prevention and response program • In the event of a spill, efforts to contain, remove or remediate any contaminant(s) causing environmental effects will be completed. • Spill response procedures and reporting will be completed in conformance with applicable federal and provincial requirements. • Secondary containment will be used for refueling and spill trays will be placed under stationary equipment located in areas where groundwater is close to surface

7.7 Assessment of Residual Effects on Groundwater

7.7.1 Residual Effects Description Criteria

Criteria used to assess residual effects on groundwater are provided in Table 7.4.

Table 7.4 Characterisation of Residual Effects on Groundwater

Potential Effect	Effect Pathway
Direction	• **Positive**—an effect that moves measurable parameters in a direction beneficial to groundwater relative to baseline • **Adverse**—an effect that moves measurable parameters in a direction detrimental to groundwater relative to baseline • **Neutral**—no net change in measurable parameters for groundwater relative to baseline
Magnitude	• **Negligible**—no measurable change to hydrological and hydrogeological flow pattern, water quantity and/or quality • **Low**—a measurable change to hydrological flow pattern and hydrogeological flow pattern, water quantity and/or quality that is within normal variability of baseline conditions • **Moderate**—a measurable change to hydrological flow pattern and hydrogeological flow pattern, water quantity and/or quality that is that is outside of the normal variability of baseline conditions, but is within regulatory limits and goals • **High**—a measurable change to hydrological and hydrogeological flow pattern, water quantity and/or quality such that federal and/or provincial authorizations may be required
Geographic extent	• **PDA**—residual effect is restricted to the PDA • **LAA**—residual effect extends into the LAA • **RAA**—residual effect extends into the RAA
Duration	• **Short-term**—residual effect is restricted to construction • **Medium-term**— residual effect extends through construction and into operation (up to 40 years) • **Long-term**—residual effect extends beyond the life of the Project
Frequency	• **Single event** • **Multiple irregular event**—occurs at no set schedule • **Multiple regular event**—occurs at regular intervals • **Continuous**—occurs continuously
Reversibility	• **Reversible**—the effect is likely to be reversed after activity completion and reclamation • **Irreversible**—the effect is unlikely to be reversed
Ecological and socio-economic context	• **Undisturbed**—area is relatively undisturbed or not adversely affected by human activity • **Disturbed**—area has been substantially previously disturbed by human development or human development is still present

7.7.2 Changes in Groundwater Quality and Quantity

Residual effects on groundwater quality and quantity may potentially occur during dewatering activities during construction. Dewatering during construction will be done in accordance with standard construction practices and mitigation measures to limit the amount of time that a trench is left open and the duration of dewatering events. The amount of drawdown is expected to be low because of the limited depth of the excavation and the relatively short period of dewatering at a given location.

The Project has the potential to change groundwater quality in the groundwater LAA as a result of accidental spills during construction and/or operation in areas where groundwater is shallow (i.e., springs, water wells). In the event of a spill, efforts to contain, remove, and remediate any contaminant(s) causing environmental effects would be completed. Liquid discharges from the Project will be primarily stormwater, directed to the stormwater pond. The stormwater will be collected in a pond located in the PDA. The pond will be constructed with a liner to prevent leaching into groundwater. On rare occasions, contaminants from a spill may be washed into the stormwater pond through Project runoff. Such contaminants may include diesel, gasoline, or industrial oil. Should any spills occur, they will be dealt with according to the Project specific spill response and reporting plan that will be developed prior to commencing operation of the Project.

With the implementation of mitigation measures, potential residual effects on groundwater will be adverse in direction, limited to the groundwater LAA, low in magnitude, occurring at multiple irregular events, short-term in duration, and reversible. Residual Project effects on groundwater are summarized in Table 7.5.

7.7.3 Summary of Residual Effects

Residual effects of the Project on groundwater are summarized in Table 7.5.

Table 7.5 Residual Effects on Groundwater

Residual Effect	Residual Effects Characterization						
	Direction	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Ecological and Socio-economic Context.**
Change in groundwater quality and quantity							
Construction	A	L	LAA	ST	IR	R	D

KEY

Refer to Table 7.4 for detailed definitions

Direction

P	Positive
A	Adverse
N	Neutral

Magnitude

N	Negligible
L	Low
M	Moderate
H	High

Geographic Extent

PDA	Project Development Area
LAA	Local Assessment Area
RAA	Regional Assessment Area

Duration

ST	Short-term
MT	Medium-term
LT	Long-term
N/A	Not applicable

Frequency

S	Single event
IR	Multiple irregular event
R	Multiple regular event
C	Continuous

Reversibility

R	Reversible
I	Irreversible

Ecological and Socio-economic Context

U	Undisturbed
D	Disturbed

7.8 Significance Determination

A residual effect on groundwater is significant if:

- A change in groundwater quality results in exceedances over Alberta Tier 1 Guidelines (AEPA. 2024b), which cannot be offset through mitigation or compensation measures (AEPA 2024b)
- A change in groundwater quantity results in a reduction in quantity, which cannot be offset through mitigation or compensation measures

With the application of recommended mitigation, residual environmental effects on groundwater are predicted to be not significant. Residual effects will not alter groundwater in such a manner that the groundwater cannot support similar land uses following decommissioning and reclamation of the Project.

8 Assessment of Potential Effects on Soil and Terrain

To assess potential effects on soil and terrain, a review of available desktop data sources and a detailed soil survey intensity level 1 (Mapping System Working Group 1981; Valentine and Lidstone 1985) was conducted in May 2025 and are summarized in Section 8.3. Detailed methods and information for data collection, soil mapping delineation, and evaluation of erosion risk, compaction risk, rutting risk, trench instability potential, and alternate soil handling requirements are described in the Soil Technical Data Report (Appendix B).

8.1 Assessment Boundaries

The soil and terrain assessment boundary is defined the PDA. The PDA encompasses the anticipated area of physical disturbance associated with the construction and operation of the Project.

No LAA or RAA was selected for the assessment of potential effects on soil and terrain as there is not anticipated effects to soils outside of the PDA.

8.2 Assessment Approach

The assessment of soils and terrain within the PDA considered the following:

- Mapping System Working Group 1981
- Specifications for Soil Survey Intensity (Survey Order) in Canada (Valentine and Lidstone 1985)
- Soils Technical Data Report (Appendix B)
- Alberta Soil Information Centre 2016
- Expert Committee on Soil Survey 1982
- Soil Inventory Database (AGRASID) (Government of Alberta [GOA] 2025b)
- Phase 1 and Phase 2 ESA (Stantec 2023a; Stantec 2023b)

8.3 Existing Conditions for Soil and Terrain

Soils in the PDA are located on previously cultivated fields within Soil Correlation Area 10 (Thick Black/ Dark Gray-Gray Soil Zone of Central and East-Central Alberta), where soils are predominantly Chernozems and Luvisols with localized areas of Solonetz and Gleysols (Alberta Soil Information Centre 2016). The majority of the PDA is level to very gentle slopes and one area with moderate slopes. Detailed soils information in provided in Appendix B.

Mitigation measures targeted at soils during construction activities to preserve baseline soil quality and soil productivity outlined in this section are provided in Section 8.6.

8.3.1 Soil Mapping and Classification

Soil profiles at each soil inspection site in the field were described according to soil attributes in the Manual for Describing Soils in the Field (Expert Committee on Soil Survey 1982) and classified to the subgroup level according to the Canadian System of Soil Classification (Soil Classification Working Group 1998). Soil series names are based on the Alberta Soil Information Viewer: Soil Inventory Database (AGRASID) (Government of Alberta 2025b) and Soil Series Information for Reclamation Planning in Alberta Volume 1 (Pedocan 1993). Soil samples were collected in the field and sent to Bureau Veritas laboratory, targeting tests to help determine major soil map units (SMUs) to support soil classification, agricultural capability ratings, reclamation suitability criteria and risk ratings.

Soil mapping was conducted to the guidelines and standards outlined by the Mapping System Working Group (1981). Soil polygons were delineated using ArcGIS software and were based on soil field survey data, available satellite imagery, and publicly available provincial and federal spatial datasets. A dominant SMU was assigned to areas of discrete homogeneous soil types and terrain conditions for both baseline characterization and as a means of presenting practical recommendations for soil management during construction and reclamation. Soil characteristics and relevant site information such as soil name, horizon depths, slope, land use, drainage, and soil handling were attributed to each polygon.

There is a total of 12 SMUs from which the soil mapping units within the PDA and are summarized in Appendix A. Most of the soils within the PDA are identified as the Angus Ridge (AGS) SMU which are moderately well drained Eluviated Black Chernozems and Orthic Black Chernozems with loam textured topsoil and clay loam textured subsoil developed on lacustro-till and till parent materials, occupying approximately 50.9 ha or 51.9% of the PDA. Variants of the AGS SMU include some areas with calcareous (ca) and deep topsoils (tk). The Hobbema (HBM) SMU also occupies a significant portion of the PDA (28.9 ha, 29.4% of the PDA). Like AGS, the HBM SMU consists of Eluviated Black Chernozems and Orthic Black Chernozems and loam textured topsoil and loam to clay loam textured subsoil with occurrences of calcareous (ca) variants. Unlike the AGS SMU, the HBM SMU is developed on glaciolacustrine and glaciolacustrine over till parent materials. To a smaller extent, Angus Ridge-coarse (AGSco; 0.2 ha, 0.2% of the PDA) and Hobbema-coarse (HBMco; 3.0 ha, 3.0% of the PDA) SMUs, which have coarser than typical subsoil textures (sandy loam and sandy loam to loam textures, respectively), are identified within the PDA.

Small depressions with evidence of excess water are identified throughout the PDA and are occupied by Hobbema-gleyed (HBMgl; 3.7 ha, 3.8% of the PDA), Hobbema-coarse-gleyed (HBMcogl; 1.8 ha, 1.9% of the PDA), and Pibroch (PIB; 0.9 ha, 0.9% of the PDA) SMUs which are imperfectly drained Gleyed Eluviated Black Chernozems and Gleyed Black Chernozems with loam textured topsoils developed on glaciolacustrine, glaciolacustrine over till, lactustro-till, and till parent materials. Depressions and areas with evidence of prolonged saturated conditions are occupied by the Haight (HGT; 3.2 ha, 3.2% of the PDA) and Haight-coarse (HGTco; 0.3 ha. 0.3% of the PDA) SMUs which are poorly drained Orthic Humic Gleysols developed on glaciolacustrine parent materials.

To a small extent, there are soils areas within the PDA impacted by fluvial events which are the Ponoka (POK) and Ponoka (POKgl) SMUs, occupying 3.6 ha or 3.7% of the PDA and 0.5 ha or 0.5% of the PDA, respectively. The POK SMU is Eluviated Black Chernozems and Orthic Black Chernozems with silty loam textured topsoils and loam textures subsoils developed on fluvial and fluvial over till parent materials. The POKgl SMU is Gleyed Eluviated Black Chernozems and Gleyed Black Chernozems with loam textured topsoils and clay loam to loam textured subsoils developed on fluvial and fluvial over till parent materials.

The potential for problem soil series, Camrose (CMO), identified during the desktop review is not confirmed within the PDA given results from the detailed soil field survey conducted in May 2025. No saline or sodic soils are observed within the PDA, as electrical conductivity is below 2 ds/m and sodium adsorption ratio is below 4 for all tested soils and is considered 'good' by the Soil Quality Criteria Relative to Disturbance and Reclamation (Alberta Agriculture, Food and Rural Development 2004. The Phase 2 ESA completed in 2023 found slightly elevated sodium adsorption ratio level (6.3) at approximately 1.8 m depth (Stantec 2023b).

Disturbed (ZDL) and open water (ZWA) areas occupy 0.4 ha (0.4% of the PDA) and 0.2 ha (0.2% of the PDA), respectively.

8.3.2 Agricultural Capability

An agricultural land capability rating was assigned to each soil map unit in the PDA. Ratings were calculated using site specific information collected during the soil survey, including the results of laboratory analyses. The approach of the Land Suitability Rating System for Agricultural Crops (Agriculture and Agri-Food Canada 1995) was applied. This system is designed to provide an agricultural capability rating for land used for spring-seeded small grain crops. Land and environmental conditions that affect arable, dryland agriculture are taken into consideration, assuming current management practices. Agricultural capability ratings within the PDA are summarized by SMU in Appendix A.

Most soils within the PDA are rated to have an agricultural capability rating 2 (87.6 ha or 89.3% of the PDA), where land has slight limitations that might restrict the growth of the specified crops or need modified management practices, including climatic restrictions, water holding capacity, soil structure, and/ or soil reaction, corresponding to the AGS, AGSco, HBM, and HBMco SMUs. To a lesser extent, soils with an agricultural capability rating 3 were identified within the PDA (6.4 ha, 6.6% of the PDA) with moderate limitations that restrict the growth of the specified crops or need special management practices due to climatic restrictions, water holding capacity, soil structure, and soil reaction, and drainage corresponding to the HBMcogl, HBMgo, and PIB SMUs. Soils classified as agricultural capability rating 6 with extremely severe limitations for sustained production of the specified crops, namely due to excess water with slight limitations from climatic restrictions and soil structure are mapped in 0.6 ha or 0.6% of the PDA and correspond to HGT and HGTco SMUs.

8.3.3 Reclamation Suitability

The reclamation suitability of soil map units in the PDA was determined using the Soil Quality Criteria Relative to Disturbance and Reclamation (Alberta Agriculture, Food and Rural Development 2004). These methods are accepted as industry standards throughout Alberta. Reclamation suitability ratings were determined for the topsoil (upper lift, A horizon) and subsoil (lower lift, B horizon) of each mapped mineral soil series using physical and chemical data for the mapped soil series. The reclamation suitability criteria were designed for mineral soils, thus, ratings for organic soil horizons were not evaluated. The rating system ranges from unsuitable for use as a reclamation material to good suitability.

The majority of the topsoil within the PDA has a reclamation suitability rating of ‘poor’ due to low pH levels (acidic) and occupy approximately 93.2 ha or 95.0% of the PDA. The majority of the subsoil within the PDA has a reclamation suitability of ‘fair’ due to low pH levels and sometimes coarse textures, occupying 93.0 ha or 94.7% of the PDA. While pH levels are considered ‘poor’ for reclamation suitability based on criteria, this does not reflect the productivity and agricultural capability ratings within the PDA described in Section 8.3.2.

8.3.4 Risk Ratings

Soil characteristics associated with each map unit were used to determine risk ratings and soil handling information. Wind erosion risk ratings for exposed soil were estimated for each soil unit within the PDAs based on their potential for maximum instantaneous soil movement by wind (Coote and Pettapiece 1989). Water erosion risk ratings for the soil units were estimated based on the Revised Universal Soil Loss Equation for Application in Canada (RUSLEFAC) (Wall et al. 2002). Compaction risk for topsoil and subsoil was determined using the Soil Compaction and Puddling Hazard Key (BC MOF 1999) and is based on soil texture and drainage regime. Rutting risk for topsoil and subsoil was determined using the Alberta Forest Products Association and Land and Forest Service (1996) methods and is based on inferred soil moisture content from drainage rating, soil texture, and landscape.

Risk ratings classified for each SMU are provided in Appendix A. While majority of soils within the PDA are identified to have very low or low wind and water erosion risks (>90 ha or 90% of the PDA), some soils are identified to have high or severe risk ratings. Majority of soils within the PDA are rated to have moderate compaction and rutting risks (>80 ha or 80% of the PDA) and to a lesser extent, some soils are rated to have high compaction and rutting risks.

8.3.5 Soil Pathogens

Clubroot is a soil-borne disease of cruciferous crops (canola and cabbage [*Brassicaceae*] family) worldwide. The causal agent of clubroot is *Plasmodiophora brassicae Woronin*. In the past, this agent has been classified as a slime mould fungus (myxomycete), but more recently, it is regarded as a protist (an organism with plant, animal and fungal characteristics).

Five compound soil samples were collected from areas within the PDA considered as 'high risk' for soil pathogens, including areas used as entrances or exists to the field as well as areas adjacent to wet areas and sent to the accredited laboratory, Element, in Edmonton, Alberta. One sample tested positive for presence of clubroot (>1000 spores/ g), and one sample detected clubroot with deoxyribonucleic acid (DNA) amplification (<1000 spores/ g). Both samples were identified near a wet area in the western side of the PDA.

8.3.6 Pre-existing Contamination

A Phase I ESA and a Limited Phase II ESA was completed in 2023 within the PDA (Stantec 2023). No pre-existing contamination was identified in soils during the Limited Phase II ESA.

8.4 Potential Effects and Pathways

Potential effects, effect pathways and the measurable parameters used to characterize and assess effects on soil capability and terrain are provided in Table 8.1.

Table 8.1 Potential Effects, Pathways and Measurable Parameters for Soil and Terrain

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in soil quality and quantity	• Soil volume loss through wind and water erosion during clearing, grading, and soil handling • Loss or alteration of soil through admixing during grading and soil handling activities • Alteration of terrain contours including soil subsidence through grading or trenching • Compaction, rutting, or loss of soil structure during vehicle and equipment movement and hauling • Soil contamination through disturbance of pre-existing contamination (if discovered), contaminated dust accumulation, or accidental spills • Introduction or spread of soil pathogens	• Characterisation, extent, and depth of topsoil and subsoil • Agricultural land capability on agricultural lands • Reclamation capability as relevant • Soil erosion risk • Soil pathogen occurrences • Compaction and rutting risk • Soil pathogen occurrences

8.5 Project Interactions with Soil and Terrain

Table 8.2 identifies which Project interactions have the potential to result in effects on soil and terrain. Potential interactions are indicated by check marks and a justification is also provided for non-interactions (no check marks).

Table 8.2 Potential Project Interactions and Effects on Soil and Terrain

Project Activity	**Potential Effect**
	Change in soil quality and quantity
Construction	✓
Operation	-

Notes:

✓ = Potential interactions that might cause an effect.

- = Interactions between the Project and the VC are not expected.

Operation of the Project is not anticipated to change soil quality and soil quantity because topsoil salvage and storage will be completed during the construction phase. As a result, operation phase effects of the Project on soil quality and quantity are not assessed further.

8.6 Mitigation

Standard industry practices and avoidance measures, along with specific mitigation, will be implemented during construction of the Project to reduce or eliminate environmental effects on soil.

Table 8.3 identifies mitigation measures that will be implemented to reduce potential adverse effects of the Project on soil.

Table 8.3 Mitigation Measures for Soil and Terrain

Potential Effect	Effect Pathway	Proposed Mitigation Measures
Change in Soil Quantity and Quality	• Soil volume loss through wind and water erosion during clearing, grading, and soil handling • Loss or alteration of soil through admixing during grading and soil handling activities • Alteration of terrain contours including soil subsidence through grading or trenching • Compaction, rutting, or loss of soil structure during vehicle and equipment movement and hauling • Soil contamination through disturbance of pre-existing contamination (if discovered), contaminated dust accumulation, or accidental spills • Introduction or spread of soil pathogens	• Maintain an intact ground surface in areas where grading is not warranted. • Topsoil stripping will be suspended during excessively wet soil or high wind conditions. • Suspend motorized vehicle traffic during excessively wet soil conditions and/or if the potential exists for topsoil/subsoil mixing due to rutting. Confine traffic to well-sodded, well drained, or frozen lands during excessively wet soil conditions to reduce compaction, rutting or loss of soil structure. • Salvage soil during construction to preserve soil quality as indicated in the Soil Reclamation Plan in the EPEA, including storing topsoil and subsoil separately and conducting alternative soil handling procedures in areas with problem soils. • A qualified soil environmental professional or designate acting under the direction of a qualified environmental professional will be onsite during construction to monitor, direct, and confirm salvage procedures in the Soil Reclamation Plan in such a way that reduces admixing of strongly contrasting qualities of soil profiles where relevant. • Salvaged soils are not to be located in low areas that could be affected by spring break-up. • Regrade areas with vehicle ruts, erosion gullies or where the trench / excavations have settled. • Following an adverse weather event, the contractor will confirm the efficacy of erosion and sediment control measures whether corrective action is required. • Grades will be restored and surface water drainage patterns will be re-established to pre-construction contours or stable grade unless otherwise directed by the appropriate regulatory body post-operation • A Soils Contingency Plan will be developed. In the event soil is suspected to be contaminated is encountered during construction, the Soils Contingency Plan will be implemented. • To prevent further spread and introduction of new soil pathogens, GECGP and contractors will implement clubroot mitigation protocols outlined in the GECGP Clubroot Management Plan.

8.7 Assessment of Residual Effects on Soil and Terrain

8.7.1 Residual Effects Description Criteria

Criteria used to assess residual effects on soil and terrain are provided in Table 8.4.

Table 8.4 Characterization of Residual Effects on Soils and Terrain

Potential Effect	Effect Pathway
Direction	• **Positive—**an improvement in soil compared with existing conditions and trends • **Adverse—**a decline in soil compared with existing conditions and trends • **Neutral—**no change in soil from existing conditions and trends
Magnitude	• **Low**—a change in soil parameters that falls within the level of natural variability, with no measurable change in soil capability • **Moderate**—a measurable change in soil parameters which is unlikely to affect soil capability (i.e., there is no change in capability class) • **High**—a measurable change in soil parameters which results in a change in soil capability (i.e., there is a change in capability class)
Geographic extent	• **PDA**—residual effect is restricted to the PDA
Duration	• **Short-term**—residual effect is restricted to construction • **Medium-term**—residual effect extends through construction and into operation (up to 40 years) • **Long-term**—residual effect extends beyond the life of the Project
Frequency	• **Single event** • **Multiple irregular event**—occurs at no set schedule • **Multiple regular event**—occurs at regular intervals • **Continuous**—occurs continuously
Reversibility	• **Reversible**—the effect is likely to be reversed after activity completion and reclamation • **Irreversible**—the effect is unlikely to be reversed
Ecological and socio-economic context	• **Undisturbed**—area is relatively undisturbed or not adversely affected by human activity • **Disturbed**—area has been substantially previously disturbed by human development or human development is still present

8.7.2 Changes in Soil Quality and Quantity

Residual effects on soil quality and quantity may result from erosion, admixing, compaction and rutting during site preparation due to soil stripping, heavy equipment and vehicle movement, and excavation and grading during construction. Potential effects on soil quality and quantity are limited to the PDA, as excavations for equipment installation will be limited to within the new fenceline.

Mitigation measures outlined are expected to reduce adverse effects on soil quality through the loss or alteration of topsoil; any residual effects will be restricted to the PDA. It is expected that equivalent land capability will be maintained or reclaimed at the end of Project life as a result of the mitigation measures implemented and the Project's Conservation and Reclamation procedures contained within the EPEA application. Short-term effects on soil quality are predicted in areas where soils will be disturbed temporarily, within the Laydown Area.

Soil in the PDA will be stripped and stored in stockpiles and mitigation measures for storage will be implemented during Project construction in accordance with the Project's EPEA approval and mitigation measures. Topsoil and upper subsoil will be salvaged and stockpiled for final reclamation of the power generation facility area which will follow decommissioning and reclamation of the Project at the end of operational life. With mitigation measures, soils are predicted to return to similar baseline conditions and land capability following recontouring and reclamation at the end of operation.

Residual effects of the Project on soil quality and quantity are discussed below for each effect pathway:

- Loss or alteration by admixing of topsoil during soil salvage, handling, and replacement may occur in areas of the PDA where soil will be disturbed during construction activities (i.e., stripping, grading, trenching). Effects to soil quality and quantity due to admixing of soil horizons may occur through processes such as over-stripping during soil salvage or soil mixing during salvage, handling, and replacement. Mitigation measures are expected to limit the loss or alteration by admixing.
- Soil compaction, pulverization, and rutting may occur in localized areas within the PDA with vehicle access, or where heavy equipment operates. Rutting risk occurs when soils are organic or relatively fine in texture, in combination with increased soil moisture content. Rutting risk can also increase on steeper slopes. Mitigation measures are expected to reduce adverse effects on soil quality as a result of compaction and rutting; however, localized compaction within the PDA may occur in areas with wet soil conditions
- Erosion of exposed soils may occur prior to being replaced and/or prior to being graveled or where topsoil will be stored
- Where soil salvage and grading occurs during construction, terrain contours, hydrology, and surface drainage might be altered which could have a negative effect on soil quality through changes in erosion and soil moisture content. The implementation of mitigation measures outlined in Section 8.4 is expected to reduce the effects of terrain changes during construction.

- If and accidental spill occurs or contaminated soil is encountered during construction and decommissioning activities, it will be removed and disposed of at an approved facility, according to applicable regulations, and replaced with suitable fill materials, as outlined in the Soils Contingency Plan.
- The introduction or spread of soil pathogens, specifically clubroot, may occur within agricultural lands from soil handling activities during construction and decommissioning. Clubroot is a soil-borne infectious disease of canola and related cruciferous plants well documented in Alberta that negatively impacts soil quality by reducing seed yield in infected plants. Clubroot has been detected within the PDA. The implementation of mitigation measures are expected to prevent further spread of this pathogen outside of the PDA as well as preventing new introductions of soil pathogens during construction and decommissioning.

8.7.3 Summary of Residual Effects

Residual effects of the Project on soil quality and quantity will be localized to the PDA, moderate in magnitude, and short to long-term in duration (i.e., until reclamation). These effects will occur during multiple irregular events during soil handling activities throughout construction and during medium-term topsoil storage for the PDA. Residual effects are considered reversible following post-construction reclamation or following operation, once natural soil processes have recommenced following decommissioning and end-of-life reclamation. Residual Project effects on soils and terrain are summarized in Table 8.5.

Table 8.5 Residual Effects on Soil and Terrain

Residual Effect	**Residual Effects Characterization**						
	Direction	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Ecological and Socio-economic Context.**
Change in soil quality and quantity							
Construction	A	M	PDA	ST/LT	IR	R	D

KEY

Refer to Table 8.4 for detailed definitions

Direction

P	Positive
A	Adverse
N	Neutral

Magnitude

N	Negligible
L	Low
M	Moderate
H	High

Geographic Extent

PDA	Project Development Area
LAA	Local Assessment Area
RAA	Regional Assessment Area

Duration

ST	Short-term
MT	Medium-term
LT	Long-term
N/A	Not applicable

Frequency

S	Single event
IR	Multiple irregular event
R	Multiple regular event
C	Continuous

Reversibility

R	Reversible
I	Irreversible

Ecological and Socio-economic Context

U	Undisturbed
D	Disturbed

8.8 Significance Determination

A residual effect on soil and terrain is significant if:

- A change in soil quality results in a reduction in soil capability, which cannot be offset through mitigation or compensation measures
- A change in soil quantity results in a reduction in soil capability, which cannot be offset through mitigation or compensation measures

With the application of recommended mitigation, residual environmental effects on soil and terrain are predicted to be not significant. Residual effects will not alter soils and terrain in such a manner that the soil cannot support similar land uses following decommissioning and reclamation of the Project.

9 Assessment of Potential Effects on Vegetation and Wetlands

To determine existing conditions for vegetation and wetlands, a field reconnaissance survey and wetland assessment was conducted in June and July 2023, and again in June 2025 which was supplemented by a desktop review of publicly available geospatial datasets to identify potential environmental considerations for vegetation and wetlands relevant to the Project.

For the purposes of this assessment, the following terms are used to describe vegetation species and ecological communities and to distinguish between those that have legislated protection and those that do not.

Plant species at risk (SAR) are species with conservation status that have legislated protection and include species listed under Schedule 1 of the *Species at Risk Act* (SARA) as endangered or threatened as well as species listed as endangered or threatened under the Alberta *Wildlife Regulation*.

Plant SOCC are species that are important contributors to biodiversity and include:

- those listed as tracked by Alberta Conservation Information Management System (ACIMS) (ACIMS 2022a, 2022b, 2024)

Ecological communities of conservation concern (ECOC) are important contributors to biodiversity and include:

- ecological communities listed as tracked or watched by ACIMS (2022c) (with the descriptions of the communities provided by Allen [2014])

Weeds were defined as plants designated as noxious or prohibited noxious by the *Weed Control Act* and listed in the Weed Control Regulation. Non-native plants were determined based on origin description of exotic on ACIMS list (ACIMS 2024).

9.1 Assessment Boundaries

The vegetation and wetlands LAA is defined by a the PDA and a 100 m buffer area from the PDA boundary. The vegetation and wetlands LAA boundary represents local vegetation and wetlands within or directly surrounding the PDA.

The vegetation and wetlands RAA is defined as the PDA and 5 km from the PDA boundary to encompass vegetation and wetland impacts from the Project. The vegetation and wetlands RAA was selected based on professional judgment based on experience with similar projects elsewhere and other projects and activities around the Project.

9.2 Assessment Approach

The assessment of vegetation and wetlands within the vegetation and wetlands LAA and RAA considered the following:

- 2025 Vegetation and Wetlands Technical Data Report (Stantec 2025)
- Endangered and Threatened Plants Range (GOA 2025a)
- Alberta Conservation Information Management System

9.3 Existing Conditions for Vegetation and Wetlands

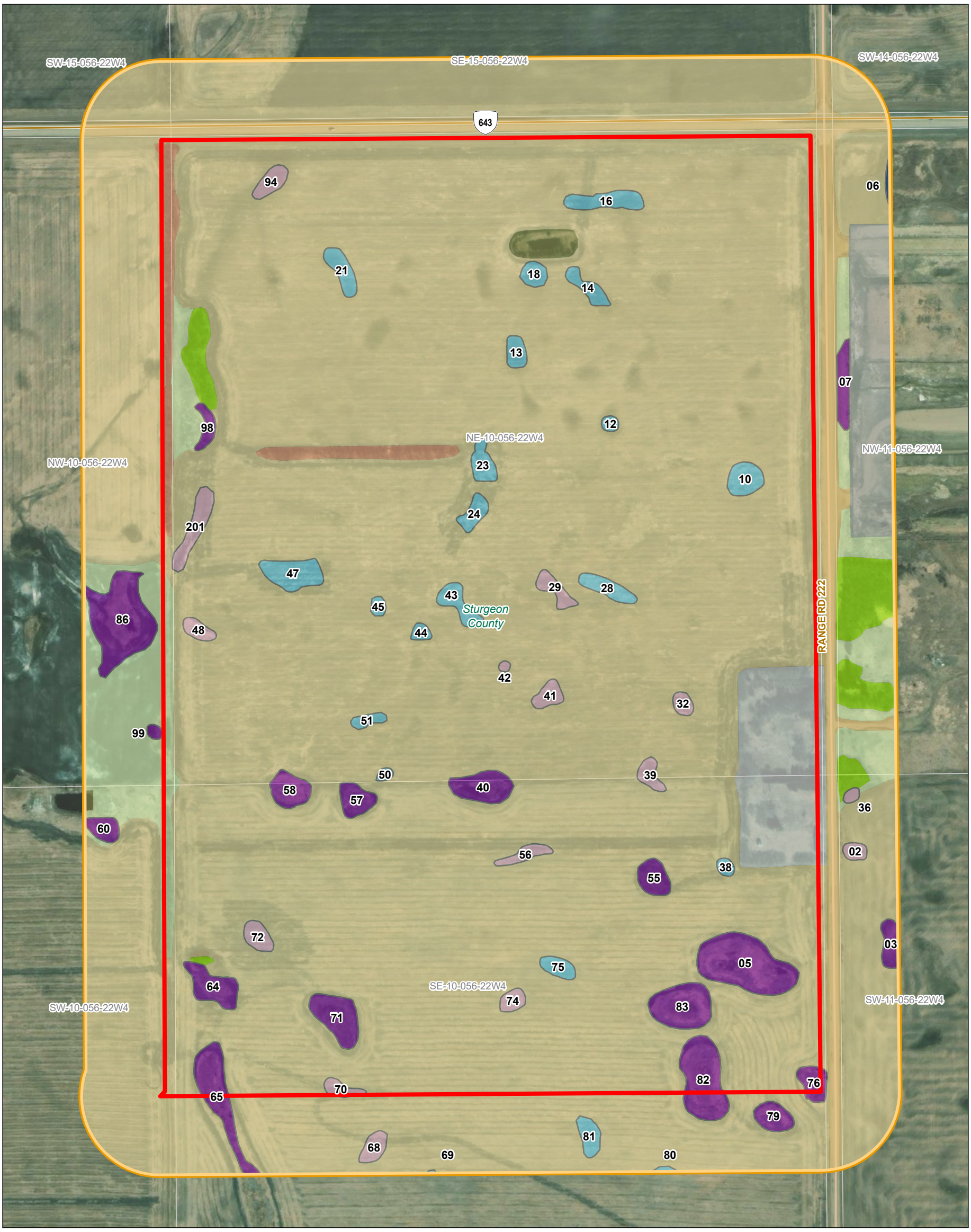
The Project is proposed to be located in the Dry Mixedwood NSR of the Boreal Natural Region of Alberta (Natural Regions Committee 2006). The PDA is predominantly cultivated with some surrounding trees, modified grassland, and an abandoned farmyard and is surrounded by cultivation, and industrial areas. Wetlands, ephemeral waterbodies, and dugouts are present on the PDA (Figure 9.1).

9.3.1 Vegetation and Wetlands and Ephemeral Waterbodies

Uplands include small areas of deciduous forest (d1 lowbush cranberry – Aw (aspen [*Populus tremuloides*]) ecosite, as described in Willoughby et al. 2021), and modified grassland including ditch areas and tame pasture dominated by agronomic species including smooth brome (*Bromus inermis*). While 4.63% of the LAA has non-cultivated upland, vegetation only 1.43% of the PDA has upland vegetation (Table 9.1). The remaining upland areas are cultivated, windrow, or other anthropogenic disturbance (Stantec 2025a)

There are 55 wetlands and ephemeral waterbodies covering 7.78 ha in the vegetation and wetlands LAA including ephemeral waterbodies, temporary graminoid marshes, seasonal graminoid marshes, and a semi-permanent graminoid marsh (Table 9.1, Table 9.2). Many of the wetlands were cultivated through at the time of the field surveys and contained agronomic and non-native species, but some contained native vegetation species including broadleaf cattail (*Typha latifolia*), tufted hairgrass (*Deschampsia cespitosa*), water knotweed (*Persicaria amphibia*), water sedge (*Carex aquatilis*), field horsetail (*Equisetum arvense*), and reed canary grass (*Phalaris arundinacea*). Forty-two wetlands and ephemeral waterbodies are partially or completely within the PDA (5.79 ha) and include 18 ephemeral waterbodies, 12 temporary graminoid marshes, and 12 seasonal graminoid marshes. No semi-permanent or permanently flooded wetlands are present on the PDA (Stantec 2025a)

Anthropogenic disturbances are the main vegetation cover in the vegetation and wetlands LAA and PDA (126.44 ha, 89.84% of the LAA, and 90.16 ha 92.62% of the PDA). Anthropogenic disturbances include mainly cultivation (115.78 ha, 82.27% of the LAA, and 86.38 ha 88.73% of the PDA), with other anthropogenic lands including rural residential (abandoned farmyard), industrial, and wind rows of mainly aspen. Two dugouts were also present in the vegetation and wetlands study area, one of which is in the PDA. The vegetation and wetlands LAA also includes industrial, and road anthropogenic lands not represented on the PDA.



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

Vegetation and Wetland

Anthropogenic
- Cultivated Agricultural
- Dugout
- Industrial
- Road
- Rural Residential
- Wind Row

Upland
- Deciduous Forest
- Modified Grassland

Wetland and Ephemeral Waterbody
- EW
- MGII
- MGIII
- MGIV
- Project Development Area
- Vegetation Local Assessment Area

- Road
- Quarter Section

0 100 200
metres

(At original document size of 11x17) 1:5,000

N

Stantec

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

Prepared by NF on 2025-07-11

Client/Project
123514064-0005
Greenlight Electricity Centre GP Ltd., on behalf of
Greenlight Electricity Centre LP.
Greenlight Electricity Centre Project
Environmental Protection and Enhancement Act

Figure No.
9.1

Title

Vegetation and Wetlands in the Local Assessment Area (LAA)

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Table 9.1 Vegetation Cover in the LAA and PDA

Cover Type	Land Classification [a,b]	PDA		LAA	
		ha	%	ha	%
Upland	Deciduous Forest - d1 low-bush cranberry - Aw	0.34	0.35	1.47	1.05
	Modified Grassland	1.05	1.08	5.04	3.58
Upland Subtotal		***1.40***	***1.43***	***6.51***	***4.63***
Wetlands and Ephemeral waterbodies	Ephemeral Waterbody (EW)	1.80	1.85	1.93	1.37
	Temporary Graminoid Marsh (MGII)	1.06	1.09	1.25	0.89
	Seasonal Graminoid Marsh (MGIII)	2.93	3.01	4.57	3.25
	Semi-permanent Graminoid Marsh (MGIV)	-	-	0.04	0.03
Wetlands Subtotal (MGII – MGIV)		***3.99***	***4.10***	***5.85***	***4.16***
Wetlands and Ephemeral Waterbodies Subtotal		***5.79***	***5.95***	***7.78***	***5.53***
Anthropogenic	Cultivated Agricultural	86.38	88.73	115.78	82.27
	Rural Residential	2.45	2.51	2.71	1.93
	Road	-	-	4.43	3.14
	Industrial	-	-	2.13	1.51
	Wind Row	1.06	1.09	1.09	0.77
	Dugout	0.28	0.29	0.31	0.22
Anthropogenic Subtotal		***90.16***	***92.62***	***126.44***	***89.84***
Total		**97.34**	**100.00**	**140.73**	**100.00**

Notes:

[a] Native upland land units (ecosites) were classified using Ecological sites of the Dry Mixedwood Subregion (Willoughby et al. 2021), Aw = aspen

[b] Wetland and ephemeral waterbody land units classified using the Alberta Wetland Classification System (GOA 2015)

"-" no intersect

Totals and subtotals may not add up due to independent rounding

Table 9.2 Wetlands and Ephemeral Waterbodies in the LAA and PDA

Wetland or Ephemeral Waterbody Class [a]	Wetland ID	PDA		LAA	
		number	ha	number	ha
Ephemeral Waterbody (EW)	10	1	0.15	1	0.15
	12	1	0.03	1	0.03
	13	1	0.09	1	0.09
	14	1	0.11	1	0.11
	16	1	0.19	1	0.19
	18	1	0.08	1	0.08
	21	1	0.13	1	0.13
	23	1	0.12	1	0.12
	24	1	0.10	1	0.10
	28	1	0.13	1	0.13
	38	1	0.04	1	0.04
	43	1	0.14	1	0.14
	44	1	0.04	1	0.04
	45	1	0.04	1	0.04
	47	1	0.23	1	0.23
	50	1	0.03	1	0.03
	51	1	0.06	1	0.06
	69	-	-	1	0.01
	75	1	0.09	1	0.09
	80	-	-	1	0.02
	81	-	-	1	0.11
Subtotal Ephemeral Waterbody		***18***	***1.80***	***21***	***1.94***
Temporary Graminoid Marsh (MGII)	2	-	-	1	0.06
	29	1	0.10	1	0.10
	32	1	0.06	1	0.06
	36	-	-	1	0.03
	39	1	0.08	1	0.08
	41	1	0.09	1	0.09
	42	1	0.02	1	0.02
	48	1	0.08	1	0.08
	56	1	0.09	1	0.09
	68	-	-	1	0.09

Wetland or Ephemeral Waterbody Class [a]	Wetland ID	PDA		LAA	
		number	ha	number	ha
Temporary Graminoid Marsh (MGII) (cont'd)	70	1	0.07	1	0.07
	72	1	0.10	1	0.10
	74	1	0.07	1	0.07
	94	1	0.11	1	0.11
	201	1	0.20	1	0.20
Subtotal Temporary Graminoid Marsh		***12***	***1.07***	***15***	***1.25***
Seasonal Graminoid Marsh (MGIII)	3	-	-	1	0.12
	5	1	0.67	1	0.67
	7	-	-	1	0.16
	40	1	0.25	1	0.25
	55	1	0.15	1	0.15
	57	1	0.14	1	0.14
	58	1	0.18	1	0.18
	60	-	-	1	0.10
	64	1	0.22	1	0.22
	65	1	0.22	1	0.39
	71	1	0.27	1	0.27
	76	1	0.08	1	0.13
	79	-	-	1	0.14
	82	1	0.31	1	0.48
	83	1	0.36	1	0.36
	86	-	-	1	0.70
	98	1	0.08	1	0.08
	99	-	-	1	0.03
Subtotal Seasonal Graminoid Marsh		***12***	***2.93***	***18***	***4.57***
Semi-permanent graminoid marsh (MGIV)	6	-	-	1	0.04
Subtotal Semi-permanent Graminoid Marsh		***-***	***-***	***1***	***0.04***
Subtotal Wetlands (MGII – MGIV)		***24***	***3.99***	***34***	***5.85***
Subtotal Wetlands and Ephemeral Waterbodies		**42**	**5.79**	**55**	**7.78**

Notes:

[a] Wetland and ephemeral waterbody land units classified using the Alberta Wetland Classification System (GOA 2015)

"-" No intersect

Totals and subtotals may not add up due to independent rounding

9.3.2 Species At Risk

No SAR were found during field surveys. Additionally, no SAR are known from the LAA (ACIMS 2022d). No plant SAR have a distribution, or critical habitat that overlaps the RAA (Government of Canada [GOC] 2025a) and the RAA is not located in an Endangered and Threatened Plants Range (GOA 2025a).

9.3.3 Species of Conservation Concern

No SOCC were found during field surveys. The search of the ACIMS records (ACIMS 2022d) indicated that no historical SAR, SOCC, or ECOC occurrences have been reported within the vegetation and wetlands LAA or PDA.

In the vegetation and wetlands RAA, outside of the vegetation and wetlands LAA and PDA, there are four occurrences of three non-vascular SOCC plants including one occurrence of urn moss (*Physcomitrium pyriforme*) (S2[2]), one occurrence of Schleicher's silk moss (*Entodon schleicheri*) (S2S3[3]), and two occurrences of cat-tongue liverwort (*Conocephalum salebrosum*) (S2S4[4]).

9.3.4 Ecological Communities of Conservation Concern

No ECOC were found during field surveys. The search of the ACIMS records (2022d) indicated no historical ECOC in the vegetation and wetlands RAA.

9.3.5 Weeds

No prohibited noxious weeds were found during 2023 or 2025 surveys. There were five species of noxious weeds found on the PDA (common burdock [*Arctium minus*], creeping thistle [*Cirsium arvense*], field bindweed [*Convolvulus arvensis*], perennial sow-thistle [*Sonchus arvensis*], and white cockle [*Silene latifolia*]) (Table 9.3). Three of these species (creeping thistle, field bindweed and perennial sow-thistle) were also found on the surrounding vegetation and wetlands LAA. The most abundant weeds were creeping thistle, found at 6 sites on the PDA in 2025 (19 sites in 2023), and perennial sow thistle found at 6 sites on the PDA in 2025 (10 sites in 2023). Density of weeds ranged from rare to continuous occurrences of plants. Many non-native species were also observed in the vegetation and wetlands LAA and PDA including some species considered invasive including smooth brome and caraway (*Carum carvi*).

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[2] Species Rank Definitions (ACIMS 2018): S2 – Known from twenty or fewer occurrences or vulnerable to extirpation because of other factors.

[3] Species Rank Definitions (ACIMS 2018): S2S3 - A numeric range rank is used to indicate any range of uncertainty about the status of the taxon between S2 (Known from twenty or fewer occurrences or vulnerable to extirpation because of other factors) and S3 (known from 100 or fewer occurrences, or somewhat vulnerable due to other factors, such as restricted range, relatively small population sizes, or other factors)

[4] Species Rank Definitions (ACIMS 2018): S2S4 – A numeric range rank is used to indicate any range of uncertainty about the status of the taxon between S2 (known from twenty or fewer occurrences or vulnerable to extirpation because of other factors) and S4 (apparently secure, taxon is uncommon but not rare, or potentially some cause for long term concern due to declines or other factors).

Table 9.3 Weed Observations in the LAA and PDA

Provincial Designation[a]	Scientific Name	Common Name	Locations Found[b]	Number of sites (2023 and 2025 combined)	Density category of occurrences (2023 and 2025 combined)[c]	Propagation
Noxious	*Arctium minus*	common burdock	PDA	3	2 - 7	seed
Noxious	*Cirsium arvense*	creeping thistle (Canada thistle)	PDA and LAA	27	4 - 11	seed and creeping roots
Noxious	*Convolvulus arvensis*	Field bindweed	PDA and LAA	9	1 - 7	seed and root cuttings
Noxious	*Silene latifolia*	white cockle	PDA	4	4 - 7	seed
Noxious	*Sonchus arvensis*	perennial sowthistle	PDA and LAA	19	3 - 9	seed and creeping roots

Notes:

[a] Weed designation from Alberta *Weed Control Regulation*; species ordered by designation then alphabetically by scientific name as per nomenclature used by ACIMS (ACIMS 2024).

[b] Weed observations reported for LAA are outside of the PDA

[c] Weed density distributions from Adams et al. 2016 are ranked 1 (rare), 2 (a few sporadically occurring individual plants), 4 (a single patch plus a few sporadically occurring plants), 7 (a few patches), 9 (several well spaced plants), 11 (continuous occurrences of plants with a few gaps in the distribution).

9.4 Potential Effects and Pathways

Potential effects, effect pathways and the measurable parameters used to characterize and assess effects on vegetation and wetlands are provided in Table 9.4.

Table 9.4 Potential Effects, Pathways and Measurable Parameters for Vegetation and Wetlands

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in vegetation communities and species	• Direct loss or alteration of native vegetation communities, including ecological communities of conservation concern, arising from clearing and ground disturbance • Indirect change in vegetation communities or species through introduction and spread of weed from materials and vehicle and equipment movement	• Area (ha) of native vegetation communities lost or altered • Area (ha) of ECOC lost or altered • Number of plant SAR or SOCC lost
Change in wetlands	• Direct loss and/or alteration of wetland vegetation arising from vegetation clearing and ground disturbance • Change in hydrological regime, storage capacity or overall function	• Area (ha) or class of wetlands lost or altered

9.5 Project Interactions with Vegetation

Table 9.5 identifies which Project interactions have the potential to result in effects on vegetation. Potential interactions are indicated by check marks and a justification is also provided for non-interactions (no check marks).

Table 9.5 Potential Project Interactions and Effects on Vegetation and Wetlands

Project Activity	Potential Effect	
	Change in vegetation communities and species	Change in wetlands
Construction	✓	✓
Operation	-	-

Notes:

✓ Potential interactions that might cause an effect.

- Interactions between the Project and the VC are not expected with the implementation of standard mitigation.

Operation is not predicted to result in any further change to native vegetation or wetlands. During operation ongoing management of noxious and prohibited noxious weed species will follow standard best management mitigation measures as required.

9.6 Mitigation

Standard industry practices and avoidance measures will be implemented during construction of the Project to reduce or eliminate environmental effects on vegetation and wetlands.

Table 9.6 identifies mitigation measures that will be implemented to reduce potential adverse effects of the Project on vegetation and wetlands.

Table 9.6 Mitigation Measures for Vegetation and Wetlands during Construction

Potential Effect	Effect Pathway	Proposed Mitigation Measures
Change in vegetation communities and species	• Direct loss or alteration of native vegetation communities, including ecological communities of conservation concern, arising from clearing and ground disturbance	• Clearing or grubbing beyond the marked construction boundaries will not be allowed • Exposed surfaces of permanently disturbed areas will be covered with mulch or a stone layer or revegetated after construction to reduce the proliferation of invasive species
	• Indirect change in vegetation communities or species through introduction and spread of weed from materials and vehicle and equipment movement	• Equipment (e.g., vehicles, materials, swamp mats, etc.) will arrive for work in a clean condition free of soil or vegetative debris, and in good working condition free of leaks to reduce the risk of introduction of weeds or soil pathogens, or contaminants • Topsoil windrows /storage areas will be monitored for weed growth during nonfrozen soil conditions and implement corrective measures, if warranted • Weed monitoring, soil pathogen testing, and control measures will be implemented during construction and operation, as required and deemed necessary by the Contractor(s). • Clean-up activities will be implemented following completion of construction.

Potential Effect	Effect Pathway	Proposed Mitigation Measures
Change in wetlands	• Direct loss and/or alteration of wetland vegetation arising from vegetation clearing and ground disturbance	• Clearing or grubbing beyond the marked construction boundaries will not be allowed • *Water Act* application and approval will be required for wetland areas which will be graded and removed, as well as any wetland permanently impacted by construction activities, including change to a catchment that alters a wetland. Wetlands permanently impacted from the PDA will be compensated for, as per the requirements of the Alberta Wetland Policy • Clearing of trees around surrounding retained wetlands will be limited to the area required to complete construction • Grading will be directed away from surrounding retained wetlands
	• Change in hydrological regime, storage capacity or overall function	• Vehicles and equipment will not be refueled or washed within 100 m of wetlands. • Berms, cross ditches, sediment fencing and/or other appropriate measures will be used to prevent erosion and siltation into adjacent wetland areas

As relevant, 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 introduction and spread of weeds and soil pathogens).

9.7 Assessment of Residual Effects on Vegetation

9.7.1 Residual Effects Description Criteria

Criteria used to assess residual effects on vegetation and wetlands are provided in Table 9.7.

Table 9.7 Characterization of Residual Effects on Vegetation and Wetlands

Characterization	Quantitative Measure or Definition of Qualitative Categories
Direction	**Positive**—an effect that moves measurable parameters in a direction beneficial to vegetation relative to baseline **Adverse**—an effect that moves measurable parameters in a direction detrimental to vegetation relative to baseline **Neutral**—no net change in measurable parameters for vegetation relative to baseline
Magnitude	**Negligible**—no measurable change **Low**—a measurable change to native upland communities, wetlands, plant species or ecological communities of conservation concern (SOCC and ECOC), but unlikely to affect their sustainability in the LAA(s), and no effect on plant SAR **Moderate**— a measurable change to native upland communities, wetlands, or plant species or ecological communities of conservation concern (SOCC and ECOC), plant SAR in the LAA(s), but unlikely to affect their sustainability in the RAA(s) **High**— effect would on its own, or as a substantial contribution in combination with other sources, affect the sustainability of native upland communities, wetlands, plant species or ecological communities of conservation concern (SOCC and ECOC), plant SAR in the RAA(s)
Geographic extent	**PDA**—residual effect is restricted to the PDA **LAA**—residual effect extends into the LAA **RAA**—residual effect extends into the RAA
Duration	**Short-term**—residual effect is restricted to construction **Medium-term**— residual effect extends through construction and into operation (up to 40 years) **Long-term**—residual effect extends beyond the life of the Project
Frequency	**Single event** **Multiple irregular event**—occurs at no set schedule **Multiple regular event**—occurs at regular intervals **Continuous**—occurs continuously
Reversibility	**Reversible**—the effect is likely to be reversed after activity completion and reclamation **Irreversible**—the effect is unlikely to be reversed
Ecological and socio-economic context	**Undisturbed**—area is relatively undisturbed or not adversely affected by human activity **Disturbed**—area has been substantially previously disturbed by human development or human development is still present

9.7.2 Changes in Vegetation Communities and Species

Vegetation clearing, stripping, and grading during Project construction will result in loss of all vegetation on the PDA including 1.40 ha of upland vegetation communities, 5.79 ha of wetlands and ephemeral waterbodies (including cropped wetlands and ephemeral waterbodies), and 90.16 ha of agricultural and residential land totaling 97.34 ha. Most of the upland vegetation communities occur on areas that are disturbed and currently support communities composed of both native and non-native species, including crops, and weeds. No ECOC, SOCC, or SAR were found in the vegetation and wetlands LAA or PDA.

Because the PDA is disturbed and contains noxious weeds and non-native species there is potential for construction to introduce and/or spread weeds and non-native species through vehicle and equipment movement. Noxious weeds in the PDA can propagate via seed, roots and root cuttings. Equipment will arrive on site clean and free of debris, mud, and plant material per Section 6.4. Weed monitoring and control measures will be implemented during construction and operation, as required and deemed necessary by the Contractor(s) or designate.

9.7.3 Changes in Wetlands and Ephemeral Waterbodies

During construction, vegetation clearing and ground disturbance will result in the direct loss of approximately 5.79 ha of wetland and ephemeral waterbody communities within the PDA. This loss represents 100% of wetlands and ephemeral waterbody communities within the PDA will be lost which is 74.35% of the area (in ha) of wetland and ephemeral waterbodies in the vegetation and wetlands LAA. Wetlands 65, 76, and 82 are located in the PDA and extend into the vegetation and wetlands LAA; however, most of these three wetlands are within the PDA. AEP requires that full compensation be made for wetlands where more than 50% of the wetland is lost and compensation will be made for the full area of these wetlands including 0.40 ha of these wetlands in the vegetation and wetlands LAA. Mitigation measures such as installing berms, sediment fencing and/or other appropriate measures will be used to prevent erosion and siltation into wetland areas adjacent to the PDA. Construction activities will conform to the Alberta *Water Act.* Required approvals under the *Water Act* will be obtained prior to construction for the removal or disturbance of wetlands.

9.7.4 Summary of Residual Effects

Residual effects of the Project on vegetation communities and species are predicted to be adverse in direction, low in magnitude and extend to the vegetation and wetlands LAA due to potential spread of weed species. Effects will occur as a single event during construction, and as multiple irregular events due to potential spread of weed species. Effects will be medium-term in duration extending through the entirety of operation. Residual effects are considered reversible following decommissioning and end-of-life reclamation. Ecological and socio-economic context of vegetation communities and species residual Project effects is disturbed.

Residual effects of the Project on wetlands are predicted to be adverse in direction, moderate in magnitude, primarily on the PDA but indirect effects may extend to the vegetation and wetlands LAA (including permanent or temporary wetland effects). Effects will occur as a single event during construction. Residual effects on wetlands will be long-term for wetland area permanently impacted by the PDA. Permanent impacts to wetland will require a *Water Act* approval and in-lieu compensation for wetland will be paid in accordance with wetland values. Impacts to these wetlands will be irreversible as wetlands will not be reclaimed following decommissioning and end-of-life reclamation. Ecological and socio-economic context of wetland residual Project effects is disturbed.

Residual Project effects on vegetation and wetlands are summarized in Table 9.8.

Table 9.8 Residual Project Effects on Vegetation and Wetlands

Residual Effect	Residual Effects Characterization						
	Direction	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Ecological and Socio-economic Context**
Change in Vegetation Communications and Species							
Construction	A	L	LAA	MT	S/IR	R	D
Change in Wetlands							
Construction	A	M	PDA/LAA	LT	S	I	D

KEY

Refer to Table 9.7 for detailed definitions

Direction

P	Positive
A	Adverse
N	Neutral

Magnitude

N	Negligible
L	Low
M	Moderate
H	High

Geographic Extent

PDA	Project Development Area
LAA	Local Assessment Area
RAA	Regional Assessment Area

Duration

ST	Short-term
MT	Medium-term
LT	Long-term
N/A	Not applicable

Frequency

S	Single event
IR	Multiple irregular event
R	Multiple regular event
C	Continuous

Reversibility

R	Reversible
I	Irreversible

Ecological and Socio-economic Context

U	Undisturbed
D	Disturbed

9.8 Significance Determination

A significant adverse residual effect on vegetation and wetlands is defined as one that, following the implementation of avoidance and mitigation measures:

- threatens the long-term persistence or viability of a plant SAR, SOCC, or ECOC
- causes a conservation-based threshold (e.g., habitat) specified in a recovery strategy or action plan to be exceeded, or incrementally contributes to an already exceeded target, for a SAR with a threatened or endangered status designation, or
- causes a net loss of wetland area or function that cannot be mitigated or compensated for or is otherwise in contravention of wetland policies or regulations following the implementation of avoidance and mitigation measures.

With the application of recommended mitigation measures and wetland compensation, residual effects on vegetation and wetlands are anticipated to be not significant.

10 Assessment of Potential Effects on Wildlife and Wildlife Habitat

Wildlife fieldwork was completed in 2023 and 2025 consisting of a wildlife habitat reconnaissance, raptor nest survey, auditory breeding bird point count survey, waterbird usage survey, a diurnal amphibian visual encounter survey, and a nocturnal amphibian acoustic survey within a wildlife study area composed of the PDA and a 1000 m buffer (Stantec 2025b). The survey methods followed Alberta's *Sensitive Species Inventory Guidelines* (AEPA 2013), where applicable.

The following terms are used to describe wildlife species and to distinguish those species of regulatory concern.

Wildlife SAR are defined as wildlife that are:

- listed under Schedule 1 of SARA as endangered, threatened, or special concern (GOC 2025a), or
- listed under the Alberta *Wildlife Act* as endangered or threatened (GOA 2024)

SOCC include species:

- listed by COSEWIC as endangered, threatened, or special concern (GOC 2025a) but not yet listed under SARA
- listed as special concern or considered data deficient by the AESCC and its Scientific Subcommittee (GOA 2024)
- listed as at risk, may be at risk, or sensitive by the General Status of Alberta Wild Species (GOA 2022)

Appendix C, Table C.1 provides a list of SAR and SOCC that have the potential to occur in the RAA.

10.1 Assessment Boundaries

The Wildlife LAA is defined as the PDA and a 1000 m buffer area from the PDA boundary. The Wildlife LAA boundary represents local wildlife and wildlife habitat within or directly surrounding the PDA.

The Wildlife RAA is defined as the PDA and 5 km from the PDA boundary to encompass wildlife and wildlife habitat impacts from the Project. The Wildlife RAA was selected based on professional judgment based on experience with similar projects elsewhere and other projects and activities around the Project.

10.2 Assessment Approach

The assessment of wildlife and wildlife habitat within the Wildlife LAA and RAA considered the following:

- Alberta Fisheries and Wildlife Management Information System (FWMIS) accessed through the Fish and Wildlife Internet Mapping Tool (AEPA 2025)
- Alberta Wildlife Sensitivity Data (e.g., Key Wildlife Ranges and Key Wildlife Layers) (GOA 2025a)
- IBAs (Bird Canada 2025 and Nature Canada 2015)
- General Nesting Periods of Migratory Birds in Canada (ECCC 2025)
- Critical habitat identified in SARA recovery strategies and management plans for species with potential to occur in the RAA
- Stantec landcover mapping and AMWI (AEP 2020)

10.3 Existing Conditions for Wildlife and Wildlife Habitat

A desktop review of existing data sources was completed to gather information about wildlife and wildlife habitat and their distribution within the wildlife LAA and RAA, with an emphasis on SAR and species of management concern.

The Project is in the Dry Mixedwood NSR of the Boreal Natural Region of Alberta (Natural Regions Committee 2006). The PDA is mainly cultivated but contains several wetlands, patches of treed areas (and modified grassland that may provide suitable habitat for wildlife. The wildlife LAA is predominantly agricultural and industrial interspersed with wetlands, treed areas, and modified grassland. The wildlife LAA does not intersect with any provincial key wildlife ranges or layers, but the provincial sharp-tailed grouse (*Tympanuchus phasianellus*) range and sensitive raptor range for bald eagle (*Haliaeetus leucocephalus*) do overlap the south and west portions of the wildlife RAA. The Project is in migratory bird nesting zone B4, for which ECCC defines an overall nesting period from mid-April to late August (ECCC 2025). There are no important bird areas within the RAA (Bird Studies Canada and Nature Canada 2015). Appendix C, Table C.1 shows SAR and SOCC potentially occurring in the Project RAA.

Suitable wildlife habitat in the wildlife LAA includes upland deciduous dominant treed and shrubby areas (29.56 ha), modified grasslands (23.79 ha), and wetlands (i.e., ephemeral, temporary, seasonal and semi-permanent wetlands) (14.27 ha). These landcover types provide breeding habitat for migratory birds, raptors and amphibians as well as year-round habitat for resident and migratory (e.g., bats) mammals. The remainder of the wildlife LAA is composed of primarily cultivated land (737.71 ha) that does not typically provide high suitability habitat to wildlife SAR and SOCC, however, it may be utilized by American badger, a federal SAR, for denning and hunting. Area of landcover types for the PDA are provided in Table 9.1.

Twenty-six species of migratory bird, one raptor, three mammal, and two amphibian species were observed in the wildlife LAA through systematic surveys and incidental observation during the 2023 and 2025 field surveys (Stantec 2025b). No important waterbird staging areas were identified within the LAA. An active coyote (*Canis latrans*) den was identified within the PDA. One raptor nest, occupied by a Swainson's hawk (*Buteo swainsoni*) was identified in the wildlife LAA outside of the PDA (Stantec 2025b).

10.3.1 Species at Risk and Species of Conservation Concern

There is potential for 21 SAR (16 migratory birds, one raptor, three mammals, and one amphibian) and 48 SOCC (31 migratory birds, seven raptors, four mammals, two reptiles, two amphibians, and two arthropods) to occur in the Project RAA based on their documented ranges (Appendix C, Table C.1). Based on the current availability of habitat, few SAR or SOCC are expected to inhabit the wildlife LAA. One sora (*Porzana carolina*), a SOCC, was observed incidentally in the wildlife LAA during the nocturnal amphibian survey (Stantec 2025b). No other SAR, SOCC, or their associated habitat features were observed in the wildlife LAA during the 2023 and 2025 wildlife surveys. FWMIS contains two historic records of SOCC within the wildlife LAA: American kestrel (*Falco sparverius*) and great gray owl (*Strix nebulosa*) (AEPA 2025). No critical habitat has been identified for federal SAR within the RAA (GOC 2025b).

10.4 Potential Effects and Pathways

The primary focus of the wildlife species and habitat component of this assessment are SOCC, including SAR as defined in Section 10, and their habitats. Potential effects, effect pathways, and the measurable parameters used to characterize and assess effects on wildlife and wildlife habitat are provided in Table 10.1.

Table 10.1 Potential Effects, Pathways and Measurable Parameters for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in habitat	Direct loss or alteration of habitat from vegetation removal and ground disturbance	Area (ha) of wildlife habitat (based on land cover classes) directly disturbed by the Project Indirect effect on wildlife habitat because of reduced habitat effectiveness (i.e., indirect habitat loss or alteration due to sensory disturbance) is addressed qualitatively Number of known habitat features for species of management concern (e.g., bald eagle nests) within the PDA or recommended setback (including SAR residences if present)
	Indirect loss or alteration of habitat effectiveness through sensory disturbance	

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in movement	Alteration or impediment of wildlife movement due to physical barriers (e.g., open trenches), or vegetation removal (i.e., gaps in forested habitat)	Estimated change in movement (e.g., due to barriers such as fencing) is assessed qualitatively
Change in mortality risk	Ground disturbance and vegetation clearing resulting in physical destruction of key habitat features (e.g., nests, dens, hibernacula)	Estimated change in mortality risk (e.g., through destruction of active nest or den, or vehicle/wildlife collisions) is assessed qualitatively
	Vehicle and equipment movement and ground disturbance resulting in accidental mortality of small, less mobile species or individuals (e.g., small rodents, amphibians, reptiles, juvenile birds)	
	Trapped wildlife (i.e., excavation areas)	
	Vehicle-wildlife collisions	
	Wildlife-human conflict	

10.5 Project interactions with Wildlife and Wildlife Habitat

Table 10.2 identifies which Project interactions have the potential to result in effects to wildlife species and habitat. These interactions are indicated by check marks and a justification is also provided for non-interactions (no check marks).

Table 10.2 Potential Project Interactions and Effects on Wildlife and Wildlife Habitat

Project Activity	Potential Effect		
	Change in Habitat	Change in Movement	Change in Mortality Risk
Construction	✓	✓	✓
Operation	✓	✓	✓

Notes:

✓ Potential interactions that might cause an effect.

- Interactions between the Project and the VC are not expected.

10.6 Mitigation

Standard industry practices and avoidance measures, along with site specific mitigation, will be implemented during construction and operation of the Project to reduce or eliminate environmental effects on wildlife species and habitat.

Table 10.3 identifies mitigation measures that will be implemented to reduce potential adverse effects of the Project on wildlife species and habitat.

Table 10.3 Mitigation Measures for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathway	Proposed Mitigation Measures
Change in Habitat	• Direct loss or alteration of habitat from vegetation removal and ground disturbance • Indirect loss or alteration of habitat effectiveness through sensory disturbance	• Activities will be restricted to the PDA to reduce vegetation loss. • Schedule vegetation clearing and wetland removal outside of the breeding period for migratory birds, raptors, and amphibians (March 15 to September 15, inclusive), when feasible. • Prior to start of clearing, clearly mark all sensitive resources and associated setbacks according to the Project specific documentation. • Avoid siting Laydown Area within sensitive environmental features and areas (e.g., wetlands, riparian areas) where practical. • Dewatering of construction areas, if necessary, will be directed to areas that avoid effects to wetlands. • During construction, reduce the extent of Site flood lighting during the migration periods (i.e., April to May and late August through October).
Change in Movement	• Alteration or impediment of wildlife movement due to physical barriers (e.g., open trenches)	• Limit the amount of time that a trench / excavation is left open, or a barrier of trenches/open pits are left open
Change in Mortality Risk	• Ground disturbance and vegetation clearing resulting in physical destruction of key habitat features (e.g., nests, dens, hibernacula) • Vehicle and equipment movement and ground disturbance resulting in accidental mortality of small, less mobile species or individuals (e.g., small rodents, amphibians, reptiles, juvenile birds) • Trapped wildlife (i.e., excavation areas) • Vehicle-wildlife collisions • Wildlife-human conflict	• Vegetation clearing will occur outside of the breeding period for migratory birds, raptors, and amphibians when feasible. • If construction activities or clearing occur during the migratory bird breeding period (April 15 to August 31) or raptor breeding period (March 15 to August 31), complete nest searches in suitable nesting habitat no more than 7 days prior to undertaking the activity. If an active nest is found, implement Site specific mitigation (e.g., setback buffers) according to the direction of a qualified wildlife professional. • If construction or clearing activities are planned during the active period for amphibians, install exclusion fencing near key amphibian habitat (e.g., suitable breeding wetland). Amphibian search, salvage, and relocation may be required and should be completed during the direction of a qualified wildlife professional. • A daily survey of excavations and trenches (i.e., prior to construction each day) will be completed to verify that no wildlife has become trapped. In the case of trapped wildlife, contact the Contractor(s). designate.

Potential Effect	Effect Pathway	Proposed Mitigation Measures
Change in Mortality Risk (cont'd)	Continued from above	• Establish construction traffic speed limits on vehicle travel routes and access roads to reduce the risk of collisions with wildlife. • Collect waste generated from the work site (e.g., construction garbage, food, industrial waste) on a regular basis and dispose at an approved facility to avoid attracting wildlife. Appropriate waste containers will be available on site. • In the event of a discovery of a wildlife SAR or species of management concern, or key habitat features during construction, report sightings to the Contractor(s). Appropriate mitigation measures will be established in consultation with the Contractor(s), qualified wildlife professional and the appropriate regulatory authorities, if warranted. • Do not harass or feed wildlife. Personnel are prohibited from hunting, possessing, or feeding wildlife on the construction footprint. • Do not permit personnel to have dogs or other pets on the work area. • An assessment of construction traffic will be completed prior to the start of construction and will inform any additional mitigation measures necessary. • Restrict all construction activities to the approved construction footprint. All construction traffic will adhere to safety and road closure regulations.

10.7 Assessment of Residual Effects on Wildlife and Wildlife Habitat

10.7.1 Residual Effects Description Criteria

Criteria used to characterize residual effects on wildlife and wildlife habitat are provided in Table 10.4.

Table 10.4 Characterization of Residual Effects on Wildlife Species and Habitat

Characterization	Quantitative Measure or Definition of Qualitative Categories
Direction	**Positive** – an effect that moves measurable parameters in a direction beneficial to wildlife and wildlife habitat relative to baseline **Adverse** – an effect that moves measurable parameters in a direction detrimental to wildlife and wildlife habitat relative to baseline **Neutral** – no net change in measurable parameters for wildlife and wildlife habitat relative to baseline
Magnitude	**Negligible** – no measurable change **Low** – a measurable change in abundance of wildlife in the LAA is unlikely, although temporary local shifts in distributions might occur **Moderate** – a measurable change in the abundance and distribution of wildlife in the LAA is possible, but a measurable change on the abundance of wildlife in the RAA is unlikely **High** – a measurable change in the abundance of wildlife in the RAA is possible
Geographic extent	**PDA** – residual effects are restricted to the PDA **LAA** – residual effects extend into the LAA **RAA** – residual effects interact with those of other projects in the RAA
Duration	**Short-term** – residual effect is restricted to construction **Medium-term** – residual effect extends through construction and up to 40 years during operation **Long-term** – residual effect extends beyond the life of the Project
Frequency	**Single event** **Multiple irregular event** – occurs at no set schedule **Multiple regular event** – occurs at regular intervals **Continuous** – occurs continuously
Reversibility	**Reversible** – the effect is likely to be reversed after activity completion and reclamation **Irreversible** – the effect is unlikely to be reversed
Ecological and socio-economic context	**Undisturbed** – area is relatively undisturbed or not adversely affected by human activity **Disturbed**—area has been substantially previously disturbed by human development or human development is still present

10.7.2 Change in Wildlife Habitat and Habitat Use

Project activities during construction and operation have the potential to result in changes to the suitability and availability of wildlife habitat and habitat use through either direct or indirect (i.e., through sensory disturbance) effects.

Construction Phase

During construction, vegetation and wetland removal and ground disturbance will result in the loss or alteration of 7.19 ha of potential wildlife habitat including 0.34 ha of upland deciduous dominant treed and shrubby areas (representing approximately 1% of similar veg cover in the wildlife LAA), 1.05 ha of modified grasslands (approximately 4% of grasslands in the wildlife LAA), and 5.79 ha of ephemeral, temporary, seasonal and semi-permanent wetlands (approximately 41% of wetlands in the wildlife LAA). Overall, the Project will cause the direct loss of approximately 17% of the suitable wildlife habitat in the wildlife LAA.

Direct Project effects on wildlife habitat during construction may be characterized as a single event that is adverse in direction and moderate in magnitude, due to the removal of habitat expected to cause a measurable change in the abundance of wildlife in the LAA, though unlikely to produce a measurable effect on wildlife populations in the broader RAA. The direct effects on wildlife habitat are likely to interact with those of other projects in the RAA, both current and planned. The effect on upland wildlife habitat is considered reversible, although the duration of effects will be long term. The effect on wetland wildlife habitat is considered to be irreversible as wetland features cannot be re-established to the condition that were altered following decommissioning and reclamation. The Project lies in an ecological and socio-economic context of highly anthropogenically modified landscape and is surrounded by a matrix of cultivation, transportation infrastructure, and industry interspersed with patches of natural vegetation and wetlands. It is within the IH-DIZ, an area identified under municipal land use planning and bylaw as heavy industrial development (Sturgeon County 2007, 2017).

Sensory disturbance associated with construction activities may deter some wildlife from effectively using otherwise suitable habitat adjacent to the PDA, resulting in a short-term indirect loss of wildlife habitat. Responses to sensory disturbance will vary depending on species and individuals but might include: (a) habitat avoidance (e.g., Bayne et al. 2008; Hamilton et al. 2011); (b) diminished reproductive success by affecting breeding/pairing communication or increasing stress response (e.g., Habib et al. 2007; Francis et al. 2011); and/or, (c) diminished fitness by affecting the ability to find prey or avoid predation (e.g., Francis et al. 2009; Francis and Barber 2013). Noise and visual stimuli from site preparation, construction equipment, and vehicle traffic may temporarily reduce the effectiveness of surrounding wildlife habitat for tree nesting raptors, migratory birds, amphibians, as well as ungulates and a variety of small and medium sized mammals that depend on forested and wetlands habitats in the wildlife LAA.

Operation Phase

The operation phase of the Project is not expected to have a direct effect on wildlife habitat availability and suitability, though noise and visual stimuli generated from operational activities may cause indirect effects thorough sensory disturbance.

During operation, the Project will affect wildlife habitat, through indirect habitat loss or alteration associated with sensory disturbance. Although existing disturbance in the area, such as vehicle traffic and other industrial noise might habituate some wildlife to elevated levels of noise emissions, some species might exhibit a negative response because of noise, and artificial lights or vibrations, particularly for chronic disturbances (Habib et al. 2007). Responses to sensory disturbance will vary depending on species and individuals but might include: (a) habitat avoidance (e.g., Bayne et al. 2008); (b) diminished reproductive success by affecting breeding/pairing communication or increasing stress response (e.g., Habib et al. 2007; Francis et al. 2011); and/or (c) diminished ability to find prey or avoid predation (e.g., Francis et al. 2009; Francis and Barber 2013). Mitigation measures, as outlined in Table 10.3, will reduce sensory disturbance within the wildlife LAA.

10.7.3 Change in Movement

During construction, direct loss of habitat and sensory disturbance generated by physical activities may impede or alter movement of wildlife through the wildlife LAA by removing or reducing the suitability of vegetated patches which facilitate wildlife movement through a predominantly agricultural landscape. During both construction and operation of the Project, fencing may represent a physical barrier to the movement of terrestrial wildlife. However, fencing the PDA will not inhibit wildlife access to important habitat or movement corridors (e.g., the North Saskatchewan River or Sturgeon River valleys) within the RAA.

10.7.4 Change in Mortality Risk

Project construction activities have the potential to increase mortality risk for wildlife, including some wildlife SAR and SOCC. Vegetation clearing, grading, and excavation have the potential to destroy nests of migratory birds and raptors, mammal dens, amphibian breeding areas and bat roost sites. Entrapment in excavations may lead to mortality for some wildlife species groups, particularly those that are smaller and less mobile such as amphibians. In addition, there might be an increased risk of mortality to mammals, birds, and amphibians in the RAA from accidental collisions with Project-related vehicle traffic (e.g., Fahrig and Rytwinski 2009; Bishop and Brogan 2013).

During operation, the increase in vehicle traffic may increased risk of mortality to mammals, birds, and amphibians in the RAA from accidental collisions with Project-related vehicle traffic (e.g., Fahrig and Rytwinski 2009; Bishop and Brogan 2013). The Project will be fenced during operation to mitigate interactions between the Project infrastructure and wildlife in the LAA.

10.7.5 Summary of Residual Effects

Indirect Project effects on wildlife habitat during construction are expected to be adverse, of moderate magnitude, and extend out of the PDA but not out of the wildlife LAA. Effects will be short-term, occurring as irregular events during the construction phase. Indirect effects on wildlife habitat from construction activity sensory disturbance are expected to reverse after the completion of the construction phase. Due to the inability to re-construct wetlands back to their original state and location, the loss of wetland habitat is considered to be irreversible.

The residual indirect effect on wildlife habitat during Project operation is expected to be low in magnitude because a measurable change in abundance of wildlife in the LAA is unlikely, although temporary local shifts in distributions might occur. Effects will the medium-term, continuous, and unlikely to extend past the LAA. With Project decommissioning, effects are expected to be reversible.

Residual effects on wildlife movement during construction and operation are predicted to be adverse but low in magnitude because a measurable change in abundance of wildlife in the LAA is unlikely, although temporary local shifts in distributions might occur. Changes in wildlife movement patterns during construction and operation will be limited to the wildlife LAA. The frequency of effects to movement are likely to be irregular during construction and continuous during operation. Residual effects are considered reversible following post-construction reclamation or after decommissioning of the Project.

With the application of mitigation measures, including surveys to identify sensitive habitat features, timing activities to avoid sensitive breeding periods, preconstruction wildlife sweeps, and management of waste generated on site, the Project's residual effect on mortality risk during the construction phase is expected to be low in magnitude. The effects will be restricted to the wildlife LAA, be short-term, and occur as multiple, irregular events based on specific activity timing. The effect on wildlife mortality risk due to Project construction activities will reverse upon completion of construction. Duration operation, Project's residual effect on mortality risk is expected to be low in magnitude, restricted to the wildlife RAA, be short-term, and occur as multiple, irregular events based on vehicle traffic.

Residual Project effects on vegetation and wetlands are summarized in Table 10.5.

Table 10.5 Residual Project Effects on Vegetation and Wetlands

Residual Effect	Residual Effects Characterization						
	Direction	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Ecological and Socio-economic Context.**
Change in Wildlife Habitat							
Construction	A	M	LAA	ST	S/IR	I	D
Operation	A	L	LAA	LT/MT	C	R	D
Change in Wildlife Movement							
Construction	A	L	LAA	ST	IR	R	D
Operation	A	L	LAA	MT	C	R	D
Change in Wildlife Mortality							
Construction	A	L	LAA	ST	IR	R	D
Operation	A	L	RAA	MT	IR	R	D

KEY

Refer to Table 10.4 for detailed definitions

Direction

P	Positive
A	Adverse
N	Neutral

Magnitude

N	Negligible
L	Low
M	Moderate
H	High

Geographic Extent

PDA	Project Development Area
LAA	Local Assessment Area
RAA	Regional Assessment Area

Duration

ST	Short-term
MT	Medium-term
LT	Long-term
N/A	Not applicable

Frequency

S	Single event
IR	Multiple irregular event
R	Multiple regular event
C	Continuous

Reversibility

R	Reversible
I	Irreversible

Ecological and Socio-economic Context

U	Undisturbed
D	Disturbed

10.8 Significance Determination

A significant adverse residual effect on wildlife species and habitat is defined as

- One that threatens the long-term persistence or viability of a wildlife species in the RAA, including effects that are contrary to or inconsistent with the goals, objectives or activities of recovery strategies, action plans and management plans.

With the application of recommended mitigation measures and wetland compensation, residual effects on wildlife species and habitat are predicted to be not significant.

11 Monitoring

Monitoring during the Project's construction and site preparation will be completed following the development of a construction plan, to confirm mitigation measures presented in this EE are implemented.

12 Summary and Conclusion

This EE has assessed the potential interactions between the Project and relevant VCs. Six VCs were carried through an evaluation to determine residual effects and their significance: Air Quality, and Acoustic Environment, Groundwater, Soil and Terrain, Vegetation and Wetlands, Wildlife Species and Habitat.

The EE determined that the potential adverse effects associated with the Project can be mitigated with Project specific mitigation measures and industry best practices, as detailed in each individual VC section. Based on this evaluation, the residual adverse effects of the Project are predicted to be not significant for all VCs.

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Appendices

Appendix A Summary of Baseline Soil Characteristics within the PDA

Table A.1 Summary of Baseline Soil Characteristics within the PDA

Modal Name	Modal SMU	Variants	Slope Class	Soil Classification*	Parent Material	Drainage Class	Agricultural Land Capability	Reclamation Suitability		Wind Erosion Risk (TS/ SS)	Water Erosion Risk (TS/ SS)	Rutting Risk (TS/ SS)	Compaction Risk (TS/ SS)	Area (ha)	Area (%)
								Rating (TS/SS)	Limitation(s) (TS/ SS)						
Angus Ridge	AGS	ca, tk	1-3	E.BLC, O.BLC	GLTL, TILL	MW	2CDV	Poor/ Fair	pH/ texture	L/L	L/L	M/M	L/M	51.5	52.5
Angus Ridge-coarse	AGSco	-	2	E.BLC, O.BLC	GLTL, TILL	MW	2CMDMV	Poor/ Good	pH/ -	L/H	VL/VL	M/L	L/L	0.2	0.2
Hobbema	HBM	ca	1-3	E.BLC, O.BLC	GLLC, GLLC/TILL	MW	2CDV	Poor/ Fair	pH/ pH	L/L	L/L	M/M	L/M	28.9	29.4
Hobbema-coarse	HBMco	tk	3	E.BLC, O.BLC	GLFL, GLFL/ TILL	MW	2CDMV	Poor/ Fair	pH/ pH	H/H	VL/VL	L/M	L/L	3.0	3.0
Hobbema-coarse-gleyed	HBMcogl	-	2-3	GLE.BLC, GL.BC	GLFL, GLFL/ TILL	MW-I	3WDCMV	Poor/ Fair	pH/ pH	L/M	L/L	M/L	M/L	1.8	1.9
Hobbema-gleyed	HBMgl	ca	1-3	GLE.BLC, GL.BC	GLLC, GLLC/TILL	MW-I	3WDCV	Poor/ Fair	pH/ pH	L/L	L/L	M/M	M/H	3.7	3.8
Haight	HGT	zl	1-3	O.HG	GLLC	P	6WDC	Poor/ Fair	pH/ pH, texture	L/L	L/L	M/M	H/H	3.2	3.2
Haight-coarse	HGTco	-	2	O.HG	GLLC	P	6WDC	Poor/ Fair	pH/ pH, texture	L/M	VL/VL	H/H	H/H	0.3	0.3
Pibroch	PIB	-	1-3	E.BLC, O.BLC	TILL	MW-I	3WDC	Poor/ Fair	pH	L/L	L/L	M/M	M/H	0.9	0.9
Ponoka	POK	-	1-3	E.BLC, O.BLC	FLUV, FLUV/TILL	MW	2CD	Good/ Good	-	L/L	M/M	M/M	L/L	3.6	3.7
Ponoka-gleyed	POKgl	-	5	GLE.BLC, GL.BC	FLUV, FLUV/TILL	MW-I	3WDCV	Good/ Good	-	L/L	S/S	L/L	M/H	0.5	0.5
Disturbed	ZDL	-	-	-	-	-	-	-	-	-	-	-	-	0.4	0.4
Water	ZWA	-	-	-	-	-	-	-	-	-	-	-	-	0.2	0.2
Total														**98.1**	**100.0**

Notes:
TS = topsoil
SS = subsoil
- = none or not applicable
* presence of Orthic Black Chernozems likely attributed to loss of eluviated horizon from historical agricultural disturbances

Variants:
ca = calcareous
co = coarse
gl = gleyed
tk = thick topsoil
zl = luvisolic

Slope Class:
1 = 0.0 to 0.5%
2 = 0.5-2.0%
3 = 2.0 to 5.0%
5 = 10.0-15.0%

Classification:
E.BLC = Eluviated Black Chernozem
O.BLC = Orthic Black Chernozem
GLE.BLC= Gleyed Eluviated Black Chernozem
GL.BLC = Gleyed Black Chernozem
O.HG = Orthic Humic Gleysol

Parent Material:
GLLC = glaciolacustrine
GLTL = lacustro-till
TILL = till
FLUV = fluvial

Drainage class:
MW = moderately well
I = imperfect
P = poor

Risk Ratings:
VL = very low
L = low
M = moderate
H = high
S = severe

Appendix B Soil Technical Data Report

Greenlight Electricity Centre Project
Soils Technical Data Report

Application to the Alberta Environment and Protected Areas

August 2025

Prepared for:
Greenlight Electricity Centre GP Ltd., on behalf of
Greenlight Electricity Centre LP.

Prepared by:
Stantec Consulting Ltd.

Project/File:
123514064

Stantec

Limitations and Sign-off

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Signature

Jason Doupe

Printed Name

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Acronyms / Abbreviations

%	percent
>	greater than
<	less than
AAFC	Agriculture and Agri-Food Canada
AAFRD	Alberta Agriculture, Food and Rural Development
AGS	Angus Ridge
ASIC	Alberta Soils Information Centre
CANSIS	Canadian Soil Information System
DIZ	Designated Industrial Zone
EPA	Alberta Environment and Protected Areas
EPEA	*Environmental Protection and Enhancement Act*
GOA	Government of Alberta
HBM	Hobbema
IH	Industrial Heartland
kV	kilovolt
m^3	cubic metre
PCR	polymerase chain reaction
PDA	Project Disturbance Area
Pedocan	Pedocan Land Evaluation Ltd.
the Project	Greenlight Electricity Centre Project
SMU	soil map unit
Stantec	Stantec Consulting Ltd.
t/ha/y	tonnes per hectare per year
TDR	Technical Data Report

1 Introduction

Stantec Consulting Ltd. was retained by Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP. to complete an application to Alberta Environment and Protected Areas (EPA) for an *Environmental Protection and Enhancement Act* (EPEA) Industrial Approval for the proposed Greenlight Power Plant Project (the Project).

The purpose of the Project is to meet the growing electric power demands of the province, particularly in the Alberta Industrial Heartland (IH) Designated Industrial Zone (DIZ) and will also supply power to data centres. The Project will connect to the Alberta Independent Electric System via a T-tap connection to the existing 240 kilovolt (kV) transmission line 942L. Make-up water, required for the steam cycle, will be sourced locally from Sturgeon County. Other components of the Project include air-cooled condensers and a generator step-up transformer.

The Pre-Disturbance Soil Assessment presented in this Technical Data Report (TDR) is based on information requirements and guidance set out in the Guideline for Industrial Operators in the Heartland DIZ (Government of Alberta [GOA 2022]), EPEA Guide to Content for Industrial Approval Applications (GOA 2013) and Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, Hydro Developments and Gas Utility Pipelines (Alberta Utilities Commission 2024).

1.1 Study Area Boundary

The Project is located on cultivated fields within Soil Correlation Area 10 (Thick Black/ Dark Gray-Gray Soil Zone of Central and East-Central Alberta), where soils are predominantly Chernozems and Luvisols with localized areas of Solonetz and Gleysols (Alberta Soils Information Centre [ASIC] 2016). The study area for soils includes the Project Disturbance Area (PDA), which occupies 98 ha in NE-10-56-22 W4M and SE-10-56-22 W4M. The PDA is located on private land currently used for cultivated crop production.

2 Methodology

This report has been prepared to provide baseline soil survey information to document current soil conditions and capability for the PDA. Soil mapping unit (SMU) polygons were developed and delineated based on the description of sixty-six soil profiles. Agricultural land capability, wind and water erosion risk, reclamation suitability, and topsoil depths and extent for soil map unit polygons were determined based on modal soil descriptions and associated soil data analytical data. Detailed descriptions of methods used for these assessments are presented in the following sections.

2.1 Data Collection

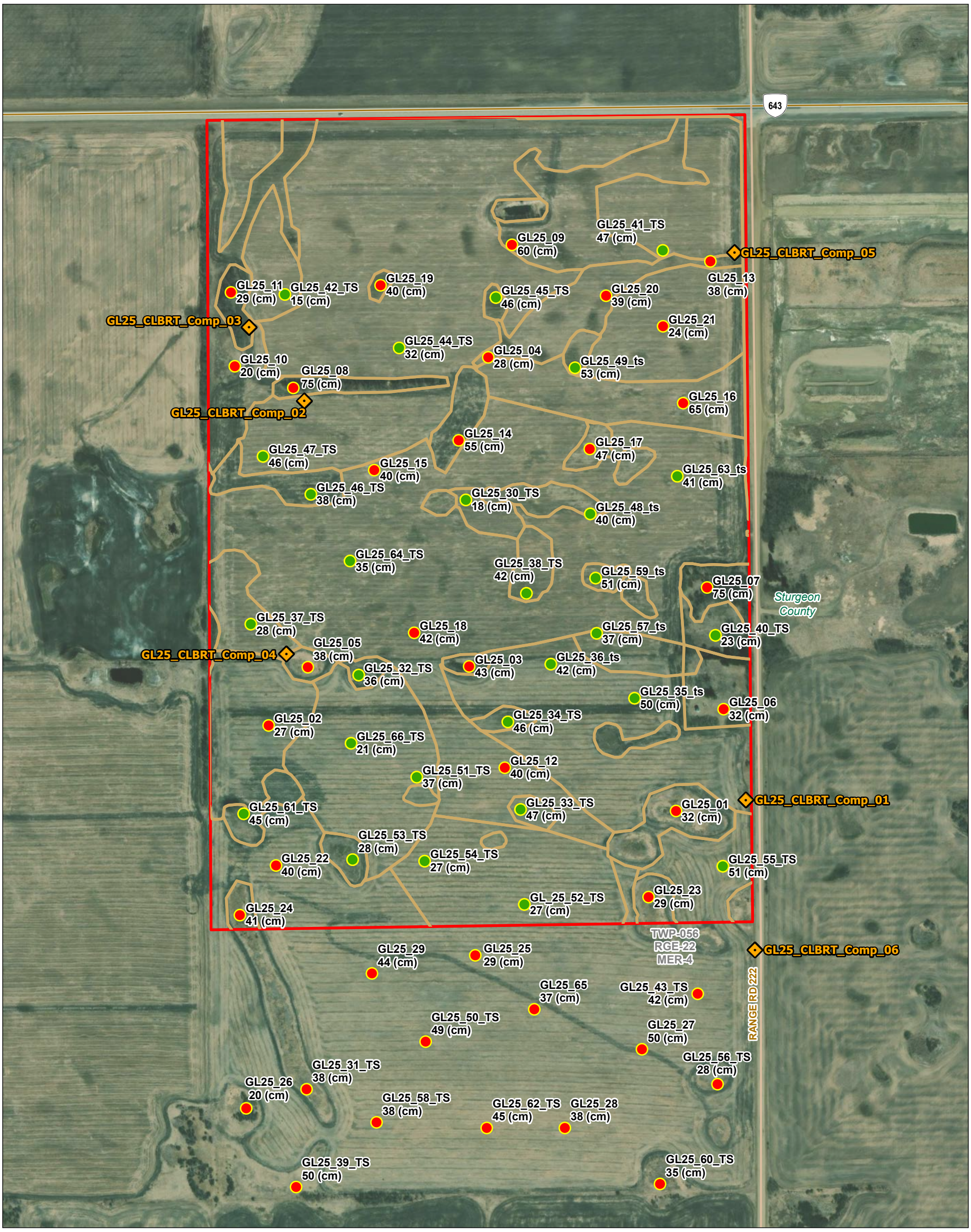
2.1.1 Desktop Review

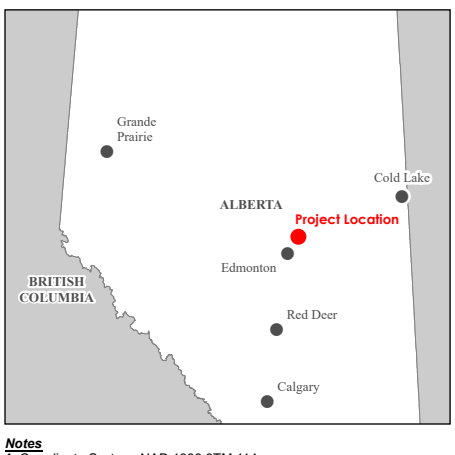
In May 2025, Stantec completed a desktop review of the following available data sources for soil mapping, analysis, and reporting purposes, where appropriate within 50 m of the PDA:

- Agricultural Region of Alberta Soil Inventory Database (AGRASID v4.1) (GOA 2025)
- Alberta Soil Names File (Generation 4) User's Handbook (ASIC 2016)
- Canada Land Inventory Soil Capability for Agriculture maps (CLI 1974)
- Canadian Soil Information System (CANSIS) Soils of British Columbia and Alberta (GOC 2019)
- CANSIS Manual for describing soils in the field (Expert Committee on Soil Survey 1983)
- Canadian System of Soil Classification (Soil Classification Working Group 1998)
- Soil Series Information for Reclamation Planning in Alberta. Volume 1 (Pedocan Land Evaluation Ltd. [Pedocan] 1993)
- Cumulative Clubroot Infestations (2003-2015) Map (GOA 2015)

2.1.2 Field Survey

Four Stantec soil scientists excavated and described a total of sixty-six soil inspections from May 23 to 26, 2025. Fifty–two of the soil inspection sites were located within the PDA and an additional fourteen soil inspection locations were dug and described south of the PDA in SE-10-56-22-4 (Figure 1). Soil samples were collected at four (4) representative soil inspection sites and sent to BV labs for analysis. Twenty nine of the soil inspection sites were dug/ augered up to120 cm for full soil profile description. Thirty seven of the soil inspection sites were 'topsoil checks' where pits were dug and described to the upper subsoil. In addition to soil inspection locations, five composite samples within the PDA and one compound sample outside of the PDA were collected (Figure 1). and tested for the presence of clubroot. the PDA and one sample was collected outside of the PDA (Figure 1). Coordinates of the sampling location were documented and soil samples were sent to Element Laboratory in Edmonton, Alberta





Clubroot Testing Location
Soil Inspection Site
Topsoil Inspection Site Survey Data Locations
Project Development Area
Soil Map Unit
Road

0 0.25 0.5
kilometres

(At original document size of 11x17) 1:6,000

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

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

Prepared by NF on 2025-07-24

Client/Project
Greenlight Electricity Centre GP Ltd., on behalf of
Greenlight Electricity Centre LP.
Greenlight Electricity Centre Project
Environmental Protection and Enhancement Act

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Figure No.
1

Title

Soil Inspection Sites and Clubroot Testing

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Availability for soil inspections in the northmost portion of the NE-10-56-22-4 quarter section was limited due to proximity to underground utilities.

At each soil inspection location, horizon characteristics including thickness, texture, structure and color were noted. Horizon terminology assigned for the site was based on the Canadian System of Soil Classification (Soil Classification Working Group 1998). Topographic, drainage, and parent material characteristics were also recorded.

2.2 Soil Mapping and Classification

Soil series names were assigned to each detailed inspection site based on soil profile descriptions and 2006 AGRASID soil names file (ASIC 2016).

Soil mapping units were named based on existing published soil series names (Pedocan 1993, ASIC 2016; GOA 2025) and delineated using stereo-imagery in an ArcGIS based computer system. Soil mapping was conducted according to the guidelines and standards outlined by the Mapping System Working Group (1981). SMU labels were assigned based on the dominant soil series. Soil mapping unit assignment incorporated existing provincial soil mapping within the PDA (GOA 2025) and field data collected in 2025.

Representative soil horizon depths, slope, land use, topsoil/ subsoil contrast, drainage, and soil handling considerations were assigned to each soil mapping unit. Mapping was completed within the PDA and mapped at a scale of 1:5,000.

2.3 Agricultural Land Capability

An agricultural land capability rating was assigned to each SMU in the PDA. Ratings were calculated using site-specific information collected during the soil survey, including the results of laboratory analyses. The approach of the Land Suitability Rating System for Agricultural Crops (Agriculture and Agri-Food Canada [AAFC] 1995) was applied. This system is designed to provide an agricultural capability rating for land used for spring-seeded small grain crops. Land and environmental conditions that affect arable, dryland agriculture are taken into consideration, assuming current management practices.

The system rates climate, soil and terrain factors independently, as each factor can control the suitability of a tract of land for crop production. The climate, soil and landscape components are integrated into a final index value, which is in one of seven classes that reflect variations in agricultural capability (see Table 2.1). For the limitations associated with the agricultural capability subclass see Table 2.2.

Table 2.1 Agricultural Capability Classes

Agricultural Capability Rating	Degree of Limitation
1	No substantial limitations for production of the specified crops.
2	Slight limitations that might restrict the growth of the specified crops or need modified management practices.
3	Moderate limitations that restrict the growth of the specified crops or need special management practices.
4	Severe limitations that restrict the growth of the specified crops or need special management practices, or both. This class is marginal for sustained production of the specified crops.
5	Very severe limitations for sustained production of the specified crops. Annual cultivation using common cropping practices is not recommended.
6	Extremely severe limitations for sustained production of the specified crops. Annual cultivation is not recommended, even occasionally.
7	Not suitable for production of the specified crops.

Source: AAFC 1995

Table 2.2 Agricultural Capability Subclasses

Agricultural Capability Subclass	Type of Limitation
C – Climate	General climatic restriction.
A – Moisture	Inadequate moisture for optimal growth of the specified crops.
H – Temperature	Inadequate heat units for optimal growth of the specified crops.
S – Soil	General soil restriction.
M – Water holding capacity and texture	Specified crops are adversely affected by lack of water because of inherent soil characteristics.
D – Soil structure	Specified crops are adversely affected by soil structure that limits depth of rooting or by surface crusting that limits emergence of shoots. Root restriction by bedrock and by a high water table is considered separately (see R and W).
F – Organic matter	Mineral soil with low organic matter content in the Ap or Ah horizon (often considered a fertility factor).
E – Depth of topsoil	Mineral soil with a thin Ap or Ah horizon (often resulting from erosion).
V – Soil reaction	Soil with a pH value either too high or too low for best growth of the specified crops.

Agricultural Capability Subclass	Type of Limitation
N – Salinity	Soils with amounts of soluble salts enough to adversely affect growth of the specified crops.
Y – Sodicity	Soils with amounts of exchangeable sodium enough to adversely affect soil structure or growth of the specified crops.
O – Organic surface	Mineral soils having a peaty surface layer up to 40 cm thick.
W – Drainage	Soils in which excess water (not because of inundation) limits production of specified crops. Excess water might result from a high water table or inadequate soil drainage.
Z – Organic soil temperature	Additional temperature limitation associated with organic soils, particularly where the regional climate has fewer than 1,600 effective growing degree days.
R – Rock	Soils with bedrock sufficiently close to the surface to affect production of the specified crops adversely.
B – Degree of decomposition or fibre content	Organic soils in which the degree of decomposition of the organic material is not best for production of the specified crops.
G – Depth and substrate	Shallow organic soils with underlying material that is not best for production of the specified crops.
L – Landscape	General landscape restriction.
T – Slope	Landscapes with slopes steep enough to incur risk of water erosion or to limit cultivation.
K – Landscape pattern	Strongly contrasting soils or non-arable obstacles that limit production of the specified crops or substantially affect management practices.
P – Stoniness and coarse fragments	Sufficiently stony (fragments coarser than 7.5 cm) or gravelly (fragments smaller than 7.5 cm in diameter) to hinder tillage or limit production of the specified crops.
J – Wood content	Organic soils with wood content or enough Eriophorum species to limit production of the specified crops.
I – Inundation	Subject to inundation or flooding that limits production of the specified crops.

Source: AAFC 1995

2.4 Reclamation Suitability

The reclamation suitability of SMUs in the PDA was determined using the Soil Quality Criteria Relative to Disturbance and Reclamation (Alberta Agriculture, Food and Rural Development [AAFRD] 1987) for the plain region of Alberta. Reclamation suitability ratings were determined for the topsoil (upper lift, A horizon) and subsoil (lower lift, B horizon) of each mapped mineral soil series using physical and chemical data for the mapped soil series. The reclamation suitability criteria were designed for mineral soils, thus, ratings for organic soil horizons were not evaluated. The rating system ranges from unsuitable for use as a reclamation material to good reclamation suitability. Table 2.3 provides a synopsis of the reclamation suitability rating system.

Table 2.3 Reclamation Suitability Rating Classes

Suitability	Class Description
Good	None to slight soil limitations that affect use for plant growth.
Fair	Moderate soil limitations that affect use but can be overcome by proper planning and good management.
Poor	Severe soil limitations that make use questionable; careful planning and very good management are required.
Unsuitable	Chemical or physical soil properties are so severe that reclamation is not possible or economically feasible.

Source: AAFRD 1987

2.5 Topsoil Depth and Extent

Field measures of topsoil depths, combined with the soil series mapping, were used to estimate the spatial variation of topsoil depth over the PDA. Prescribed salvage depths were assigned to each SMU for use in reclamation planning.

2.6 Risk Ratings

2.6.1 Wind

Wind erosion risk was determined using methodology outlined by Coote and Pettapiece (1987). Calculations of wind erosion result in a dimensionless index E that are arbitrarily assigned class values, as seen in Table 2.4 below. The parameters used to estimate the risk of wind erosion (E) include: average monthly wind speed, surface roughness, texture, and moisture content of soil. Wind data for Edmonton Airport were derived from Environment Canada Climate Normals 1991 to 2020 (Environment Canada 2025) and were adjusted using the equations found in Coote and Pettapiece (1987). The soil texture parameter was obtained from soil unit mapping and field results. Moisture content assumed soils were at wilting point [footnote: wilting point is defined as a matric potential of -1500 kilopascal, the force

holding water to particle surfaces]. Wilting point is commonly considered the moisture content at which annual plants can no longer remove water from the soil and was estimated from soil texture and using the Soil Texture Triangle Hydraulic Properties Calculator (Pedosphere 2002)].

Table 2.4 Relative Susceptibility of Wind Erosion Ratings

Rating	**E (Dimensionless Index of Wind Erosion Risk)**
Negligible	<100
Low	100.0-249.9
Moderate	250.0-399.9
High	400.0-699.9
Severe	>700.0

Reference: Coote and Pettapiece 1989

2.6.2 Water Erosion

The methodology outlined by Wall et al. (2002) has been used to estimate potential soil erosion risk due to precipitation. Risk is expressed on an annual basis and assumes bare ground conditions for both topsoil and exposed upper subsoil. The calculation accounts for rainfall erosivity (R), particle resistance (K), topographic effects (LS), vegetation cover (C) and any management practice or mitigation imposed (P). The calculation estimates soil erosion in tonnes per hectare per year and is further classified on an ordinal scale from very low to severe erosion potential.

2.6.3 Rutting

Soil rutting occurs when the soil deforms under the force of a load (Arnup 1998). A number of factors affect a soil's susceptibility to rutting, including moisture content at the time of the load, soil texture and landscape position (Alberta Forest Products Association and Land and Forest Service [AFPA and LFS] 1996). According to AFPA and LFS (1996), the most important factor for determining rutting risk is soil moisture content. Dry soils, regardless of texture, will retain their strength. However, as a soil's moisture content increases, so does its susceptibility to rutting. A soil is more prone to rutting than compaction because all the pore space is filled with water. Fine-textured soils, such as clays and silts, are more plastic than coarse-textured soils and at greater risk of rutting. The soil's landscape position plays a role in its moisture content, by influencing drainage and runoff. The rating system of rutting susceptibility (see Table 2.5) was used to determine rutting risk for the soil map units in the LSA. While the system was modified from systems applied to forestry applications, the underlying concepts are fully valid for agricultural soils. Forest and agricultural soils have the same range of texture and drainage upon which this system is based.

Table 2.5 Generalized Risk Rating System for Compaction

Factor	Characteristic	Rating
Soil texture	Sand, loamy sand, sandy loam	1
	All other textures	2
	Organic	3
Soil water content	Brunisols, coarser textured Regosols	1
	Chernozems, Luvisols, finer textured Solonetzics, finer textured Regosols	2
	Gleysols, Organic	3
Landscape	Slope Classes 3 to 5*	1
	Slope Classes 1 to 2*	2
	Slope C 6*	3
Rating (determined by multiplying soil, water content and landscape ratings together)		
Low		1–4
Moderate		5–11
High		12–27

Source: Modified from AFPA and LFS 1996

Note:

* Slope Classes 1 and 2 have gradients less than 2%; Classes 3 to 5 have gradients between 2% and 15%; Classes 6 have gradients > 15%.

2.6.4 Compaction

Susceptibility to soil compaction depends on soil physical properties, the moisture content during the disturbance and the nature of the applied force (Cannon and Landsburg 1990). Generally, soil compaction risk increases with higher clay content, higher soil moisture content and lower organic matter content (Cannon and Landsburg 1990). The generalized rating system for compaction risk (see Table 2.6) was developed using professional judgment and a review of two compaction systems that had been designed for forestry applications:

- Soil Compaction and Puddling Hazard Key (British Columbia Ministry of Forests 1999)
- Table of Compaction and Rutting Hazard for Soils in Ontario (Archibald et al. 1997)

This generalized rating system takes into consideration texture and drainage regime. It was used to determine compaction risk for the map units in the PDA using site-specific information collected in the field in May of 2025. While the system was modified from systems applied to Forestry applications, the underlying concepts are considered valid for Agricultural soils. Furthermore, both forest and agricultural soils possess the same range of texture and drainage upon which this system is based.

Table 2.6 Compaction Risk Matrix

Drainage	Textural Class					
	Very Coarse (S, LS, LFS)	**Moderately Coarse (SL, FSL)**	**Medium (VFSL, L, SiL)**	**Moderately Fine (SCL, CL, SiCL, Si)**	**Fine/Very Fine (SC, SiC, C, HC)**	**Organic**
Rapid	Low	Low	-	-	-	-
Well	Low	Low	Low	Moderate	Moderate	
Imperfect	Low	Low	Moderate	High	High	
Poor	Moderate	Moderate	High	High	High	
Very Poor	-					High

Notes:

S = sand
LS = loamy sand
LFS = loamy fine sand
SL = sandy loamy
FSL = fine sandy loam
VFSL = very fine sandy loam
L = loam
SiL = silt loam,
SCL = sandy clay loam
CL = clay loam
SiCL = silty clay loam
Si = silt
SC = sandy clay
SiC = silty clay
C = clay
HC = heavy clay

2.7 Clubroot Occurrences

Clubroot is a soil-borne disease of canola, mustard and other cruciferous crops caused by a *Plasmodiophora brassicae*. In canola, the disease causes swellings and/or forming of galls on the roots, which cause a reduction in canola yields or can ultimately cause premature death of the plant. An early infection during favorable conditions and moderate to high spore loads can lead to up to 100 per cent yield loss, while low spore loads with less favorable conditions may result in little or no yield loss (Alberta Agriculture and Forestry 2015).

Currently there is no economically viable measure to remove the pathogen from soil other than introduce changes into the cropping system, grow clubroot-resistant varieties of crops, crop rotations and adhering to rigorous and expensive sanitation procedures. The longevity of clubroot resting spores is a key reason why clubroot is a serious disease for canola production. The spores can survive in the soil for up to 15-20 years once the clubroot is established. Clubroot is spread by the movement of soil containing soilborne resting spores on infected farm machinery, vehicles, earth moving equipment, tools and footwear. The spread of the pathogen and its incidence and severity of disease can be reduced by minimizing the risk of soil movement, implementing a sanitation plan, diligently scouting and record keeping among other agronomic practices were found to be the most effective methods of controlling this disease (Canola Council of Canada 2024). Among other biosecurity measures, minimizing the movement of soil into and out of the field is the key way to prevent the introduction and spread of clubroot.

The most reliable way to confirm clubroot is to assess roots of susceptible plants for presence of galls. Soil and plant testing for clubroot deoxyribonucleic acid (DNA) is conducted by laboratories; however, understanding the variability of spore load in soil is important when interpreting soil sample results.

During soil sample collection for clubroot testing, Stantec followed sampling procedure recommended by Canola Counsel of Canada (2019) and GOA (2014). Sampling locations were selected at the field entrances, high traffic areas and cultivated soils with higher moisture content. Sampling tools were cleaned to prevent cross contamination between sampling locations and plant residue was removed from the soil surface prior to soil sample collection. Soil was sampled from 0-5 cm depth interval within “W-shaped” sampling pattern with soil sub-samples collected at locations spaced approximately 20 m from each other. Soil sub-samples collected at the same assessment area were composed together. Soil samples were sent to Element Laboratory in Edmonton, Alberta where they were analyzed using modified real time polymerase chain reaction (PCR) method (Wallenhammar et al. 2012).

3 Results

3.1 Soil Mapping and Classification

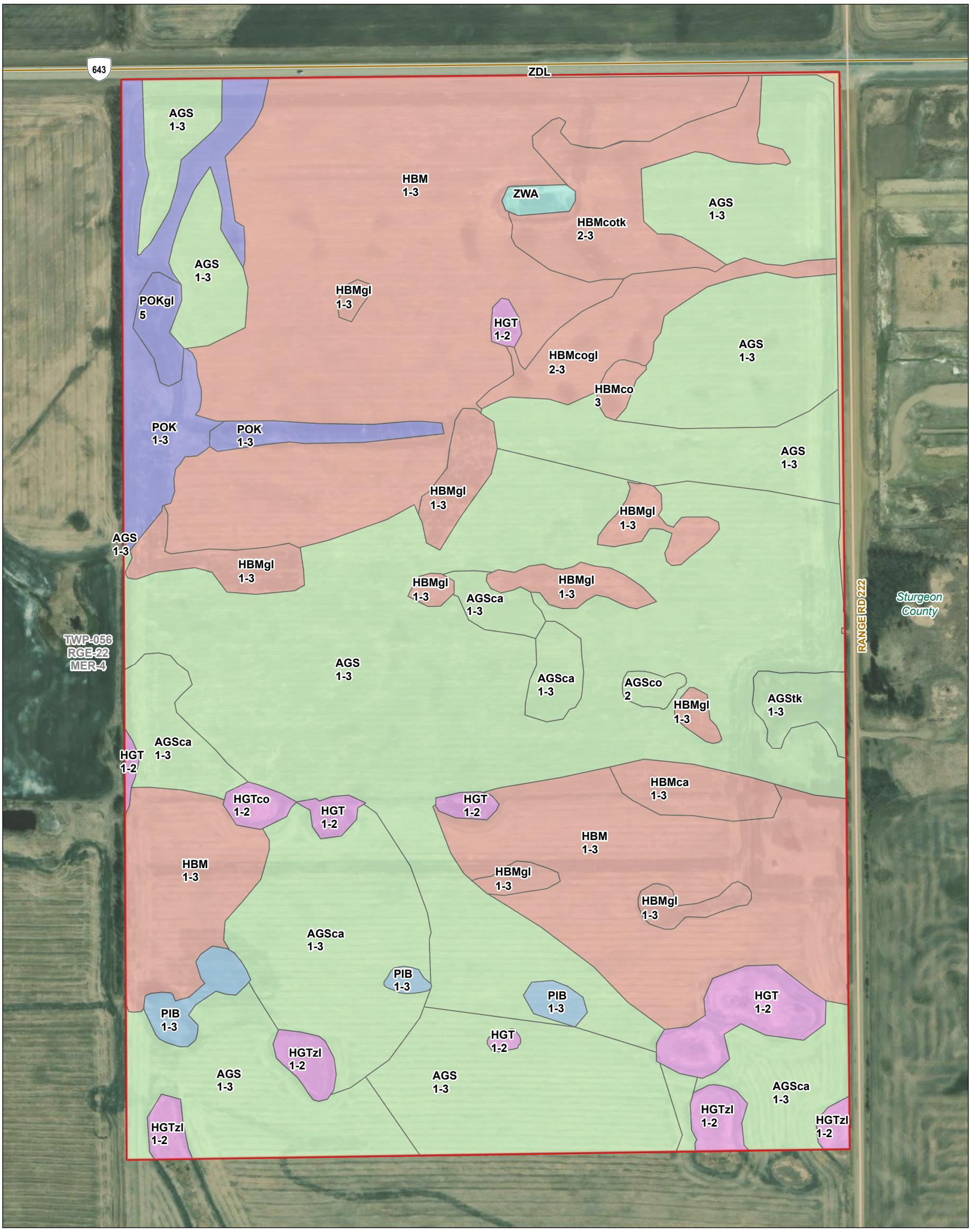
The 12 SMUs within the PDA are shown in Figure 2 and summarized in Table 3.1. Soil profile field data is provided in Appendix A, laboratory results are provided in Appendix B, representative profiles are provided in Appendix C, and selected field photos are provided in Appendix D.

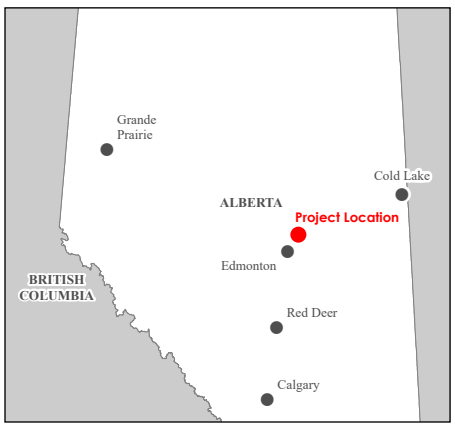
The Angus Ridge (AGS) SMU occupies the largest portion of the PDA (50.9 ha or 51.9% of the PDA) which are moderately well drained Eluviated Black Chernozems and Orthic Black Chernozems with loam textured topsoil and clay loam textured subsoil developed on lacustro-till and till parent materials. Variants of the AGS SMU include some areas with calcareous (ca) and deep topsoils (tk). The Hobbema (HBM) SMU also occupies a significant portion of the PDA (28.9 ha, 29.4% of the PDA). Like AGS, the HBM SMU consists of Eluviated Black Chernozems and Orthic Black Chernozems and loam textured topsoil and loam to clay loam textured subsoil with occurrences of calcareous (ca) variants. Unlike the AGS SMU, the HBM SMU is developed on glaciolacustrine and glaciolacustrine over till parent materials. To a smaller extent, Angus Ridge-coarse (AGSco; 0.2 ha, 0.2% of the PDA) and Hobbema-coarse (HBMco; 3.0 ha, 3.0% of the PDA) SMUs, which have coarser than typical subsoil textures (sandy loam and sandy loam to loam textures, respectively), are identified within the PDA.

Small depressions with evidence of excess water are identified throughout the PDA and are occupied by Hobbema-gleyed (HBMgl; 3.7 ha, 3.8% of the PDA), Hobbema-coarse-gleyed (HBMcogl; 1.8 ha, 1.9% of the PDA), and Pibroch (PIB; 0.9 ha, 0.9% of the PDA) SMUs which are imperfectly drained Gleyed Eluviated Black Chernozems and Gleyed Black Chernozems with loam textured topsoils developed on glaciolacustrine, glaciolacustrine over till, lactustro-till, and till parent materials. Depressions and areas with evidence of prolonged saturated conditions are occupied by the Haight (HGT; 3.2 ha, 3.2% of the PDA) and Haight-coarse (HGTco; 0.3 ha. 0.3% of the PDA) SMUs which are poorly drained Orthic Humic Gleysols developed on glaciolacustrine parent materials.

To a small extent, there are soils areas within the PDA impacted by fluvial events which are the Ponoka (POK) and Ponoka (POKgl) SMUs, occupying 3.6 ha or 3.7% of the PDA and 0.5 ha or 0.5% of the PDA, respectively. The POK SMU is Eluviated Black Chernozems and Orthic Black Chernozems with silty loam textured topsoils and loam textures subsoils developed on fluvial and fluvial over till parent materials. The POKgl SMU is Gleyed Eluviated Black Chernozems and Gleyed Black Chernozems with loam textured topsoils and clay loam to loam textured subsoils developed on fluvial and fluvial over till parent materials.

Disturbed (ZDL) and open water (ZWA) areas occupy 0.4 ha (0.4% of the PDA) and 0.2 ha (0.2% of the PDA), respectively.





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

Soil Name
- Angus
- Haight
- Hobbema
- Pibroch
- Ponoka
- ZDL
- ZWA
- Project Development Area
- Road

Soil Map Unit Label:
HGTzl --- Soil Map Unit
2 --- Slope Class

Soil Map Units - Variants:	Slope Class:
ca Calcareous	1 0 - 5%
co Coarse	2 0.5- 2.0%
gl Gleyed	3 >2.0 - 5.0%
tk Deep topsoil	4 >5 - 10%
zl Luvisolic	

0 100 200
Meters

(At original document size of 11x17) 1:4,500

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

Prepared by NF on 2025-07-24

Client/Project
Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP.
Greenlight Electricity Centre Project
Environmental Protection and Enhancement Act

123514064-0006

Figure No.
2

Title

Soil Series Classification and Distribution

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Table 3.1 Soil Series Type and Distribution within the PDA

Modal Name	Modal SMU	Variants	Slope Class	Soil Classification*	Parent Material	Drainage Class	Area (ha)	Area (%)
Angus Ridge	AGS	ca, tk	1-3	E.BLC, O.BLC	GLTL, TILL	MW	51.5	52.5
Angus Ridge-coarse	AGSco	-	2	E.BLC, O.BLC	GLTL, TILL	MW	0.2	0.2
Hobbema	HBM	ca	1-3	E.BLC, O.BLC	GLLC, GLLC/TILL	MW	28.9	29.4
Hobbema-coarse	HBMco	tk	3	E.BLC, O.BLC	GLFL, GLFL/ TILL	MW	3.0	3.0
Hobbema-coarse-gleyed	HBMcogl	-	2-3	GLE.BLC, GL.BC	GLFL, GLFL/ TILL	MW-I	1.8	1.9
Hobbema-gleyed	HBMgl	ca	1-3	GLE.BLC, GL.BC	GLLC, GLLC/TILL	MW-I	3.7	3.8
Haight	HGT	zl	1-3	O.HG	GLLC	P	3.2	3.2
Haight-coarse	HGTco	-	2	O.HG	GLLC	P	0.3	0.3
Pibroch	PIB	-	1-3	E.BLC, O.BLC	TILL	MW-I	0.9	0.9
Ponoka	POK	-	1-3	E.BLC, O.BLC	FLUV, FLUV/TILL	MW	3.6	3.7
Ponoka-gleyed	POKgl	-	5	GLE.BLC, GL.BC	FLUV, FLUV/TILL	MW-I	0.5	0.5
Disturbed	ZDL	-	-	-	-	-	0.4	0.4
Water	ZWA	-	-	-	-	-	0.2	0.2

Notes:

- = none or not applicable

* presence of Orthic Black Chernozems likely attributed to loss of eluviated horizon from historical agricultural disturbances

Variants:
ca = calcareous
co = coarse
gl = gleyed
tk = thick topsoil
zl = luvisolic

Slope Class:
1 = 0.0 to 0.5%
2 = 0.5-2.0%
3 = 2.0 to 5.0%
5 = 10.0-15.0%

Classification:
E.BLC = Eluviated Black Chernozem
O.BLC = Orthic Black Chernozem
GLE.BLC= Gleyed Eluviated Black Chernozem
GL.BLC = Gleyed Black Chernozem
O.HG = Orthic Humic Gleysol

Parent Material:
GLLC = glaciolacustrine
GLTL = lacustro-till
TILL = till
FLUV = fluvial

Drainage class:
MW = moderately well
I = imperfect
P = poor

Risk Ratings:
VL = very low
L = low
M = moderate
H = high
S = severe

3.2 Agricultural Land Capability

Agricultural land capability ratings for soils within the PDA are summarized in Table 3.2. A majority of soils within the PDA were rated to have Class 2 agricultural land capability, occupying approximately 87.6 ha or 89.3% of the PDA. These areas have slight limitations due to combinations of climate (C), structure (D), moisture (M), drainage (W), and reaction (V). Class 3 soils within the PDA occupy approximately 6.4 ha or 6.6 % of the PDA. Class 3 soils within the PDA have moderate limitations to crop growth due to combinations of climate (C), structure (D), moisture (M), drainage (W), and reaction (V). Class 6 soils identified within the PDA occupy approximately 3.4 ha or 3.5% of the PDA with extremely severe limitations for crop production. Class 6 soils are limited namely due to drainage (W) and to a lesser extent climate (C) and structure (D).

Table 3.2 Agricultural Land Capability Class for Soils within the PDA

Agricultural Land Capability Class	Subclass	Subclass Area (ha)	Subclass Area (%)	Class Area (ha)	Class Area (%)
2 - Slight limitations that might restrict the growth of the specified crops or need modified management practices.	2CD	3.6	3.7	87.6	89.3
	2CDMV	3.0	3.0		
	2CDV	80.4	81.9		
	2CMD	0.2	0.2		
	2WDCV	0.5	0.5		
3 - Moderate limitations that restrict the growth of the specified crops or need special management practices.	3WDC	0.9	0.9	6.4	6.6
	3WDCMV	1.8	1.9		
	3WDCV	3.7	3.8		
6 – Extremely severe limitations for sustained production of the specified crops. Extremely severe limitations for sustained production of the specified crops. Annual cultivation is not recommended, even occasionally.	6WDC	3.4	3.5	3.4	3.5
[1]Not Rated	-			0.6	0.6
Total		**98.1**	**100.0**	**98.1**	**100.0**

Source: AAFC 1995

Note:

[1] Not rated includes disturbed land (ZDL) and open water (ZWA) SMUs.

3.3 Reclamation Suitability

Reclamation suitability for soils within the PDA are summarized in Table 3.3. A majority of the PDA has topsoil with 'poor' reclamation suitability due to acidity (low pH), occupying approximately 93.2 ha or 95.0% of the PDA. Approximately 3.6 ha or 3.7% of the PDA has topsoil with 'good' reclamation suitability. A majority of the PDA has subsoil with 'fair' reclamation suitability due to acidity (low pH) and in some areas coarse textures, occupy approximately 93.0 ha or 94.7% of the PDA. Approximately 3.9 ha or 4.0% of the PDA has subsoil with 'good' reclamation suitability.

Table 3.3 Reclamation Suitability for Soils within the PDA

Reclamation Suitability class	Limitations[1]	Area (ha)	Area (%)
Topsoil			
Good	-	3.6	3.7
Fair	-	-	-
Poor	pH	93.2	95.0
Not Rated	-	1.3	1.3
	Total	**98.1**	**100.0**
Subsoil			
Good	-	3.9	4.0
Fair	pH, texture	93.0	94.7
Poor	-	-	-
Not Rated	-	1.3	1.3
	Total	**98.1**	**100.0**

Source: Eastern plains criteria

Note:

[1] Although ratings are generally 'poor' for reclamation suitability, this does not reflect agricultural land capability ratings.

3.4 Topsoil Depth and Extent

Based on soil inspection sites in the field, topsoil depths within the PDA range from approximately 15 cm to 75 cm across all SMUs. Areas with no topsoil or non-salvageable topsoil include disturbed land (ZDL) and areas with open water (ZWA). The estimated topsoil average and extent within the PDA for each SMU is summarized in Table 3.4. Topsoil salvage prescription depths assigned are shown in Table 3.5 and Figure 3. The estimated topsoil salvage volume within the PDA is 384,797 cubic metres (m^3).

Table 3.4 Topsoil Extent by SMU within the PDA

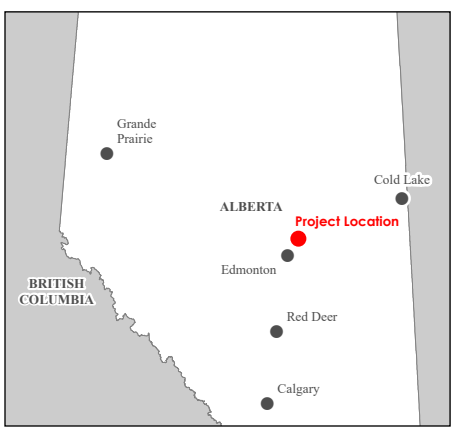
Modal SMU	Topsoil Range (cm)	Topsoil Average (cm)	Area (ha)	Area (%)
AGS	15-75	36	51.5	52.5
AGSco	51-51	51	0.2	0.2
HBM	27-46	36	28.9	29.4
HBMco	53-60	57	3.0	3.0
HBMcogl	38-38	38	1.8	1.9
HBMgl	38-55	44	3.7	3.8
HGT	28-46	35	3.2	3.2
HGTco	38-38	38	0.3	0.3
PIB	45-47	46	0.9	0.9
POK	20-75	48	3.6	3.7
POKgl	25-29	27	0.5	0.5
ZDL	0-0	0	0.4	0.
ZWA	0-0	0	0.2	0.2

Table 3.5 Topsoil Salvage Prescriptions and Estimated Salvage Volume

Topsoil Salvage Prescription Depth (m)	Area (m^2)	Estimated Topsoil Salvage Volume (m^3)
0.0 or N/A	6,004	0.0
0.15	21,343	3,201
0.2	34,895	6,979
0.25	33,270	8,318
0.3	121,814	36,544
0.35	50,579	17,703
0.4	496,576	198,630
0.45	89,929	40,468
0.5	50,831	25,415
0.6	63,105	37,863
0.75	12,900	9,675
Total	**981,246**	**384,797**

Note:

[1] Topsoil salvage depth includes material A horizon and or overlying organic duff layer. Values have been rounded to the nearest metre.



Soil Salvage Depth (cm)

- <Null>
- 15
- 20
- 25
- 30
- 35
- 40
- 45
- 50
- 60
- 75
- Project Development Area
- Road

0 100 200

Meters

(At original document size of 11x17) 1:4,500

N

Stantec

Notes

1. Coordinate System: NAD 1983 3TM 114

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

3. Imagery: Strathcona County, Sturgeon County, Maxar

Project Location Prepared by NF on 2025-07-24

NE ¼ and SE ¼ 10-056-22 W4M, Alberta

Client/Project 123514064-0006

Greenlight Electricity Centre GP Ltd., on behalf of
Greenlight Electricity Centre LP.
Greenlight Electricity Centre Project
Environmental Protection and Enhancement Act

Figure No.

3

Title

Topsoil Salvage Prescriptions and Stockpile Locations

C:\Users\wahowse\AppData\Local\Temp\85\ArcGISProTemp23564\Untitled\Untitled.aprx Revised: 2025-08-18 By: wahowse

3.5 Risk Ratings

Wind and water erosion risks as well as compaction and rutting risks for topsoil and subsoil within the PDA are provided in Table 3.6.

Table 3.6 Risk Ratings for Soils within the PDA

Rating	Wind Erosion		Water Erosion		Compaction Risk[3]		Rutting Risk[3]	
	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)
Topsoil								
Negligible	-	-	-	-	-	-	-	-
Very Low	-	-	3.5	3.6	-	-	-	-
Low	94.5	96.3	93.6	95.3	87.2	88.8	3.5	3.5
Moderate	-	-	-	-	6.9	7.0	93.8	95.6
High	3.0	3.0	-	-	3.4	3.5	0.3	0.3
Severe	-	-	0.5	0.5	-	-	-	-
Not Rated[1]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total[2]	**98.1**	**100.0**	**98.1**	**100.0**	**98.1**	**100.0**	**98.1**	**100.0**
Subsoil								
Negligible	-	-	0.9	0.9	-	-	-	-
Very Low	-	-	3.5	3.6	-	-	-	-
Low	92.2	93.9	92.6	94.4	8.6	8.8	2.5	2.6
Moderate	2.1	2.2	-	-	80.4	81.9	94.7	96.5
High	3.2	3.3	-	-	8.5	8.7	0.3	0.3
Severe	-	-	0.5	0.5	-	-	-	-
Not Rated[1]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total[2]	**98.1**	**100.0**	**98.1**	**100.0**	**98.1**	**100.0**	**98.1**	**100.0**

Notes:

- = none or not applicable

[1] Not rated areas include water (ZWA) and disturbed land (ZDL) SMUs.

[2] Totals may not sum due to rounding.

[3] Compaction and rutting risks include low, moderate, and high ratings only.

3.6 Clubroot Occurrences

A summary of results for soil samples collected and tested for clubroot are provided in Table 3.7 and laboratory results are provided in Appendix B.2. One sample tested positive for presence of clubroot (>1000 spores/ g), and one sample detected clubroot with deoxyribonucleic acid (DNA) amplification (<1000 spores/ g) indicating clubroot is present in the PDA. Both samples were identified near a wet area in the western side of the PDA (Figure 1).

Table 3.7 Clubroot Test Results for Soils within the PDA

Sample ID	Approximate Composite Sample Location (UTM 12)		Alberta Township	Test Result[1]
	Easting	Northing		
GL25_CLBRT_comp_01	356862	5966038	SE-10-56-22-W4M	-
GL25_CLBRT_comp_02	356254	5966679	NE-10-56-22-W4M	detected, >1000 spores/ g
GL25_CLBRT_comp_03	356173	5966821	NE-10-56-22-W4M	caution, <1000 spores/ g and measured DNA amplification
GL25_CLBRT_comp_04	356195	5966293	NE-10-56-22-W4M, SE-10-56-22-W4M	not detected, <1000 spores/ g
GL25_CLBRT_comp_05	356872	5966865	NE-10-56-22-W4M	not detected, <1000 spores/ g
GL25_CLBRT_comp_062	356857	5965807	SE-10-56-22-W4M	not detected, <1000 spores/ g

Notes:

[1] Element Analytical Report number 1816718 (Appendix B.2).

[2] Sample not within the PDA due to footprint changes

3.7 Summary

Site specific soil information was collected from 52 locations in the PDA during May 2025. Analysis of the data allowed interpretation of dominant soil series in the PDA and the delineation of areas with similar soil properties. Table 3.8 provides a summary of baseline soil characteristics, classes, and ratings by SMU.

There is a total of 12 SMUs within the PDA. Most of the soils within the PDA are identified as the AGS SMU which are moderately well drained Eluviated Black Chernozems and Orthic Black Chernozems with loam textured topsoil and clay loam textured subsoil developed on lacustro-till and till parent materials.

Most of the PDA has moderate to slight limitations towards agricultural land capability and topsoil ranges from 15 to 75 cm. It is advised that topsoil be salvaged using prescribed salvage depths as guidance. Despite the topsoil depth and favorable land capability, topsoil ratings are typically poor in terms of reclamation suitability due to low pH. Wind and water erosion risks for soils within the PDA are generally considered low. Majority of soils within the PDA are rated to have moderate compaction and rutting risks.

Table 3.8 Summary of Baseline Soil Characteristics within the PDA

Modal Name	Modal SMU	Variants	Slope Class	Soil Classification[1]	Parent Material	Drainage Class	Agricultural Land Capability	Reclamation Suitability		Wind Erosion Risk (TS/ SS)	Water Erosion Risk (TS/ SS)	Rutting Risk (TS/ SS)	Compaction Risk (TS/ SS)	Area (ha)	Area (%)
								Rating (TS/SS)	Limitation(s) (TS/ SS)						
Angus Ridge	AGS	ca, tk	1-3	E.BLC, O.BLC	GLTL, TILL	MW	2CDV	Poor/ Fair	pH/ texture	L/L	L/L	M/M	L/M	51.5	52.5
Angus Ridge-coarse	AGSco	-	2	E.BLC, O.BLC	GLTL, TILL	MW	2CMDMV	Poor/ Good	pH/ -	L/H	VL/VL	M/L	L/L	0.2	0.2
Hobbema	HBM	ca	1-3	E.BLC, O.BLC	GLLC, GLLC/TILL	MW	2CDV	Poor/ Fair	pH/ pH	L/L	L/L	M/M	L/M	28.9	29.4
Hobbema-coarse	HBMco	tk	3	E.BLC, O.BLC	GLFL, GLFL/ TILL	MW	2CDMV	Poor/ Fair	pH/ pH	H/H	VL/VL	L/M	L/L	3.0	3.0
Hobbema-coarse-gleyed	HBMcogl	-	2-3	GLE.BLC, GL.BC	GLFL, GLFL/ TILL	MW-I	3WDCMV	Poor/ Fair	pH/ pH	L/M	L/L	M/L	M/L	1.8	1.9
Hobbema-gleyed	HBMgl	ca	1-3	GLE.BLC, GL.BC	GLLC, GLLC/TILL	MW-I	3WDCV	Poor/ Fair	pH/ pH	L/L	L/L	M/M	M/H	3.7	3.8
Haight	HGT	zl	1-3	O.HG	GLLC	P	6WDC	Poor/ Fair	pH/ pH, texture	L/L	L/L	M/M	H/H	3.2	3.2
Haight-coarse	HGTco	-	2	O.HG	GLLC	P	6WDC	Poor/ Fair	pH/ pH, texture	L/M	VL/VL	H/H	H/H	0.3	0.3
Pibroch	PIB	-	1-3	E.BLC, O.BLC	TILL	MW-I	3WDC	Poor/ Fair	pH	L/L	L/L	M/M	M/H	0.9	0.9
Ponoka	POK[2]	-	1-3	E.BLC, O.BLC	FLUV, FLUV/TILL	MW	2CD	Good/ Good	-	L/L	M/M	M/M	L/L	3.6	3.7
Ponoka-gleyed	POKgl[2]	-	5	GLE.BLC, GL.BC	FLUV, FLUV/TILL	MW-I	3WDCV	Good/ Good	-	L/L	S/S	L/L	M/H	0.5	0.5
Disturbed	ZDL	-	-	-	-	-	-	-	-	-	-	-	-	0.4	0.4
Water	ZWA	-	-	-	-	-	-	-	-	-	-	-	-	0.2	0.2
Total														**98.1**	**100.0**

Notes:
TS = topsoil
SS = subsoil
- = none or not applicable

[1] presence of Orthic Black Chernozems likely attributed to loss of eluviated horizon from historical agricultural disturbances

[2] No laboratory sampling was collected for POK or POKgl SMUs, therefore, the nutrient and chemical profile including pH is unknown

Variants:
ca = calcareous
co = coarse
gl = gleyed
tk = thick topsoil
zl = luvisolic

Classification:
E.BLC = Eluviated Black Chernozem
O.BLC = Orthic Black Chernozem
GLE.BLC= Gleyed Eluviated Black Chernozem
GL.BLC = Gleyed Black Chernozem
O.HG = Orthic Humic Gleysol

Parent Material:
GLLC = glaciolacustrine
GLTL = lacustro-till
TILL = till
FLUV = fluvial

Slope Class:
1 = 0.0 to 0.5%
2 = 0.5-2.0%
3 = 2.0 to 5.0%
5 = 10.0-15.0%

Drainage class:
MW = moderately well
I = imperfect
P = poor

Risk Ratings:
VL = very low
L = low
M = moderate
H = high
S = severe

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Appendices

Appendix A Soil Profile Data

Table A.1 Site Data

Site	Survey Date	Easting	Northing	Surface Expression	Slope Position	Slope Gradient (%)	Drainage	Topsoil Depth (cm)	Subsoil Depth (cm)	Parent Material	Order	Subgroup	Series Code
GL25_01	5/23/2025	356769	5966048	Undulating	Depressional	1	Imperfect	32	30	GLLC/TILL	Gleysol	Humic Luvic Gleysol	HGT
GL25_02	5/24/2025	356164	5966202	Undulating	Mid-Slope	2	Moderately Well	27	33	GLLC/TILL	Chernozem	Orthic Black Chernozem	HBM
GL25_03	5/24/2025	356468	5966278	Undulating	Depressional	3	Poor	43	7	GLFL/GLTL	Gleysol	Orthic Humic Gleysol	HGTco
GL25_04	5/23/2025	356516	5966739	Undulating	Mid-Slope	2	Imperfect	28	47	GLFL/TILL	Chernozem	Gleyed Black Chernozem	HBMcogl
GL25_05	5/24/2025	356226	5966287	Undulating	Depressional	2	Poor	38	22	GLFL/TILL	Gleysol	Orthic Humic Gleysol	HGTco
GL25_06	5/24/2025	356846	5966198	Plain	Level	0	Moderately Well	32	28	GLLC/TILL	Chernozem	Orthic Black Chernozem	HBM
GL25_07	5/24/2025	356829	5966381	Plain	Mid-Slope	4	Moderately Well	75	43	TILL	Chernozem	Eluviated Black Chernozem	AGS
GL25_08	5/23/2025	356222	5966706	Depression	Depressional	1	Moderately Well	75	40	FLUV	Chernozem	Eluviated Black Chernozem	POK
GL25_09	5/23/2025	356559	5966906	Depression	Depressional	3	Moderately Well	70	25	GLFL/TILL	Chernozem	Eluviated Black Chernozem	HBMcotk
GL25_10	5/23/2025	356136	5966742	Depression	Depressional	4	Moderately Well	20	11	FLUV/TILL	Chernozem	Eluviated Black Chernozem	POK
GL25_11	5/23/2025	356135	5966853	Gentle Slope	Mid-Slope	10	Moderately Well	29	34	FLUV/TILL	Chernozem	Gleyed Black Chernozem	POKgl
GL25_12	5/25/2025	356515	5966124	Undulating	Upper Slope	2	Moderately Well	40	20	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_13	5/23/2025	356855	5966869	Undulating	Mid-Slope	3	Imperfect	38	27	GLFL/TILL	Chernozem	Gleyed Eluviated Dystric Brunisol	HBMcogl
GL25_14	5/24/2025	356467	5966617	Undulating	Depressional	3	Moderately Well	55	50	GLLC/TILL	Chernozem	Gleyed Eluviated Black Chernozem	HBMgl
GL25_15	5/24/2025	356339	5966578	Undulating	Upper Slope	2	Moderately Well	40	30	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_16	5/24/2025	356805	5966658	Undulating	Depressional	2	Moderately Well	65	25	TILL	Chernozem	Eluviated Black Chernozem	AGS
GL25_17	5/23/2025	356663	5966596	Plain/Level	Lower Slope	2	Moderately Well	47	23	GLLC/TILL	Chernozem	Eluviated Black Chernozem	HBM
GL25_18	5/24/2025	356388	5966332	Undulating	Mid-Slope	3	Moderately Well	42	28	GLTL	Chernozem	Calcareous Black Chernozem	AGS
GL25_19	5/23/2025	356360	5966854	Depression	Depressional	2	Imperfect	40	55	GLLC/TILL	Chernozem	Gleyed Eluviated Black Chernozem	HBMgl
GL25_20	5/23/2025	356697	5966824	Plain	Lower Slope	3	Imperfect	39	21	GLFL	Chernozem	Gleyed Eluviated Black Chernozem	HBMcogl
GL25_21	5/23/2025	356780	5966775	Plain	Mid-Slope	3	Moderately Well	24	49	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_22	5/24/2025	356166	5965992	Undulating	Mid-Slope	4	Moderately Well	40	50	TILL	Chernozem	Eluviated Black Chernozem	AGS
GL25_23	5/24/2025	356722	5965921	Undulating	Depressional	2	Poor	29	16	GLLC	Gleysol	Humic Luvic Gleysol	HGT
GL25_24	5/24/2025	356109	5965920	Depression	Depressional	3	Imperfect	41	34	FLUV	Gleysol	Humic Luvic Gleysol	HGT
GL25_25	5/25/2025	356459	5965845	Undulating	Mid-Slope	3	Moderately Well	29	16	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_26	5/25/2025	356106	5965630	Plain	Depressional	0	Poor	20	30	GLLC	Gleysol	Humic Luvic Gleysol	HGT
GL25_27	5/25/2025	356703	5965693	Undulating	Lower Slope	3	Moderately Well	50	15	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_28	5/25/2025	356582	5965581	Undulating	Upper Slope	3	Moderately Well	38	14	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_29	5/25/2025	356303	5965824	Plain	-	-	Imperfect	44	21	TILL	Chernozem	Gleyed Eluviated Black Chernozem	PIB
GL25_30_TS	5/24/2025	356474	5966527	Undulating	Crest	2	Moderately Well	18	-	TILL	Chernozem	Calcareous Black Chernozem	AGS

Site	Survey Date	Easting	Northing	Surface Expression	Slope Position	Slope Gradient (%)	Drainage	Topsoil Depth (cm)	Subsoil Depth (cm)	Parent Material	Order	Subgroup	Series Code
GL25_31	5/25/2025	356198	5965655	Plain/Level	Depressional	1	Imperfect	38	22	FLUV	Gleysol	Orthic Humic Gleysol	HGT
GL25_32_TS	5/24/2025	356302	5966272	Undulating	Depressional	3	Imperfect	36	-	GLLC	Gleysol	Orthic Humic Gleysol	HGT
GL25_33_TS	5/25/2025	356536	5966060	Plain	Lower Slope	1	Imperfect	47	-	TILL	Chernozem	Gleyed Eluviated Black Chernozem	PIB
GL25_34_TS	5/24/2025	356523	5966192	Undulating	Lower Slope	3	Imperfect	46	-	GLLC/TILL	Chernozem	Gleyed Black Chernozem	HBMgl
GL25_35_TS	5/24/2025	356714	5966220	Undulating	Lower Slope	2	Moderately Well	50	-	GLLC/TILL	Chernozem	Eluviated Black Chernozem	HBM
GL25_36_TS	5/24/2025	356591	5966276	Undulating	Mid-Slope	3	Moderately Well	42	-	GLLC	Chernozem	Orthic Black Chernozem	HBM
GL25_37_TS	5/24/2025	356144	5966355	Undulating	Upper Slope	2	Moderately Well	28	-	TILL	Chernozem	Calcareous Black Chernozem	AGS
GL25_38_TS	5/24/2025	356558	5966383	Undulating	Mid-Slope	2	Imperfect	42	-	TILL	Chernozem	Gleyed Calcareous Black Chernozem	PIB
GL25_39	5/25/2025	356176	5965509	Undulating	Mid-Slope	1	Moderately Well	50	25	TILL	Chernozem	Gleyed Calcareous Black Chernozem	HBMgl
GL25_40_TS	5/24/2025	356839	5966309	Plain	Mid-Slope	4	-	23	-	TILL	Chernozem	Eluviated Black Chernozem	AGS
GL25_41_TS	5/23/2025	356785	5966888	Undulating	Mid-Slope	2	Moderately Well	47	-	TILL	Chernozem	Eluviated Black Chernozem	AGS
GL25_42_TS	5/23/2025	356216	5966846	Undulating	Toe	2	Moderately Well	15	-	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_43_TS	5/24/2025	356790	5965773	Undulating	Mid-Slope	2	Moderately Well	50	-	TILL	Chernozem	Calcareous Black Chernozem	AGS
GL25_44_TS	5/23/2025	356383	5966759	Undulating	Depressional	2	-	32	-	GLLC	Chernozem	Orthic Black Chernozem	HBM
GL25_45_TS	5/23/2025	356531	5966828	Plain	Toe	4	Imperfect	46	-	GLLC	Gleysol	Humic Luvic Gleysol	HGT
GL25_46_TS	5/24/2025	356242	5966545	-	-	-	Imperfect	38	-	GLLC/TILL	Chernozem	Gleyed Eluviated Black Chernozem	HBMgl
GL25_47_TS	5/23/2025	356173	5966605	Undulating	Crest	2	Moderately Well	46	-	TILL	Chernozem	Orthic Black Chernozem	HBM
GL25_48_TS	5/23/2025	356659	5966499	Plain	Mid-Slope	2	Imperfect	40	-	GLLC/TILL	Chernozem	Gleyed Eluviated Black Chernozem	HBMgl
GL25_49_TS	5/23/2025	356646	5966718	Plain	Lower Slope	2	Moderately Well	53	-	TILL	Chernozem	Eluviated Black Chernozem	AGSco
GL25_50_TS	5/25/2025	356379	5965719	Undulating	Mid-Slope	4	Moderately Well	49	-	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_51_TS	5/25/2025	356383	5966115	Plain	Mid-Slope	3	Moderately Well	37	-	TILL	Chernozem	Calcareous Black Chernozem	AGS
GL25_52_TS	5/25/2025	356536	5965918	Undulating	Upper Slope	4	Moderately Well	27	-	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_53_TS	5/25/2025	356282	5965996	Plain	-	1	Poor	28	-	GLLC	Gleysol	Humic Luvic Gleysol	HGT
GL25_54_TS	5/25/2025	356389	5965989	Undulating	Mid-Slope	3	Moderately Well	40	-	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_55_TS	5/24/2025	356835	5965962	Undulating	Mid-Slope	4	Moderately Well	51	-	TILL	Chernozem	Calcareous Black Chernozem	AGS
GL25_56_TS	5/24/2025	356814	5965637	Undulating	Depressional	1	Imperfect	28	-	GLLC	Gleysol	Orthic Humic Gleysol	HGT
GL25_57_TS	5/24/2025	356661	5966319	Undulating	Mid-Slope	2	Moderately Well	37	-	GLLC	Chernozem	Calcareous Black Chernozem	HBM
GL25_58_TS	5/25/2025	356301	5965601	Plain	Mid-Slope	2	Imperfect	38	-	TILL	Chernozem	Gleyed Eluviated Black Chernozem	PIB
GL25_59_TS	5/23/2025	356663	5966402	Plain	Lower Slope	2	Moderately Well	51	-	TILL	Chernozem	Eluviated Black Chernozem	AGSco
GL25_60_TS	5/25/2025	356721	5965491	Depression	Lower Slope	3	Imperfect	35	-	TILL	Chernozem	Gleyed Eluviated Black Chernozem	PIB
GL25_61_TS	5/24/2025	356121	5966071	Undulating	Lower Slope	2	Moderately Well	45	-	TILL	Chernozem	Gleyed Eluviated Black Chernozem	PIB

Site	Survey Date	Easting	Northing	Surface Expression	Slope Position	Slope Gradient (%)	Drainage	Topsoil Depth (cm)	Subsoil Depth (cm)	Parent Material	Order	Subgroup	Series Code
GL25_62_TS	5/25/2025	356465	5965586	Plain	Mid-Slope	3	Moderately Well	45	-	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_63_TS	5/23/2025	356792	5966549	Plain	Mid-Slope	3	Moderately Well	41	-	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_64_TS	5/24/2025	356296	5966443	Undulating	Crest	3	Moderately Well	35	-	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_65_TS	5/25/2025	356544	5965760	Undulating	Mid-Slope	3	Moderately Well	34	-	TILL	Chernozem	Orthic Black Chernozem	AGS
GL25_66_TS	5/24/2025	356286	5966170	Undulating	-	-	-	21	-	TILL	Chernozem	Calcareous Black Chernozem	AGS

Table A.2 Horizon Data

Site	Horizon	Depth (cm)	Colour	Consistence	Structure (Grade/Class/Kind)	Mottles (Abundance/Size/Contrast)	Coarse Fragments (% vol)	Coarse Fragment Type	Texture	Carbonates	Salinity
GL25_01	LFH	5-0	-	-	-	-	-	-	-	-	-
	Ah	0-25	10YR 2/2	Very Friable	W/F/GR	-	0	-	L	None	None
	Ae	25-32	2.5Y 5/2	Very Friable	W/F/PL	-	0	-	FSL	None	None
	Btgj	32-62	2.5Y 4/3	Firm	M/C/SBK	C/F/D	2	Coarse gravel	CL	None	None
	Cgk	62-90	2.5Y 4/2	Very Firm	-	C/F/P	2	-	CL	Moderate	None
GL25_02	Ap	0-27	10YR 2/2	Friable	W/F/GR	-	0	-	L	None	None
	Bm	27-60	10YR 4/2	Friable	M/C/SBK	-	1	-	L	None	None
	Ckg	60-85	2.5Y 5/3	Firm	-	C/F/D	1	-	SCL	None	None
GL25_03	Ah	0-43	-	Friable	W/F/GR	-	0	-	L	None	None
	Bm	43-50	10YR 4/2	Firm	W/M/SBK	-	0	-	LS	None	None
	Cg1	50-62	2.5Y 6/2	Friable	-	C/M/D	0	-	VFSL	None	None
	Cg2	62-72	2.5Y 5/2	Firm	-	C/M/D	0	-	CL	None	None
GL25_04	Ap	0-28	10YR 2/2	Friable	M/M/SBK	-	0	-	L	None	None
	Bmgj	28-75	2.5Y 4/4	Very Friable	W/M/SBK	C/F/D	0	-	LS	None	None
	C	75-110	10YR 5/3	Firm	-	C/F/F	0	-	SCL	None	None
GL25_05	LFH	2-0	-	-	-	-	-	-	-	-	-
	Ah1	0-20	10YR 2/2	Very Friable	W/F/GR	-	0	-	L	None	None
	Ah2	20-38	10YR 2/2	Friable	W/M/SBK	-	1	-	L	None	None
	Bgj	38-60	2.5Y 3/2	Friable	M/C/SBK	F/F/F	5	Fine gravel	SL	None	None
	Cg	60-80	2.5Y 4/2	Firm	-	M/M/P	5	Fine gravel	CL	None	None
GL25_06	LFH	2-0	-	-	-	-	-	-	-	-	-
	Ap	0-32	10YR 2/2	Friable	M/M/GR	-	0	-	L	None	None
	Bm	32-60	10YR 4/3	Friable	W/M/SBK	-	0	-	L	None	None
	BCkj	60-85	10YR 5/4	Friable	-	-	0	-	SCL	Weak	None
	Ck	85-90	10YR 5/3	Firm	-	-	10	Gravel	SCL	Strong	None
GL25_07	LFH	2-0	-	-	-	-	-	-	-	-	-
	Ah	0-75	10YR 2/1	Friable	W/M/GR	-	2	Gravel	L	None	None
	Bt	75-118	10YR 3/4	Firm	M/M/SBK	-	0	-	CL	None	None

Site	Horizon	Depth (cm)	Colour	Consistence	Structure (Grade/Class/Kind)	Mottles (Abundance/Size/Contrast)	Coarse Fragments (% vol)	Coarse Fragment Type	Texture	Carbonates	Salinity
GL25_08	Ah	0-60	10YR 2/1	Very Friable	W/M/SBK	-	0	-	SiL	None	None
	Ae	60-75	2.5Y 5/2	Very Friable	W/F/PL	-	0	-	SiL	None	None
	Btj	75-90	2.5Y 5/4	Very Friable	-	F/M/F	0	-	SiCL	None	None
	Bm	90-115	2.5Y 5/3	Very Friable	-	-	0	-	SL	Very Weak	None
	BC	115-120	2.5Y 5/6	Firm	-	M/F/F	0	-	SCL	Weak	None
GL25_09	Ap1	0-37	10YR 2/2	Friable	W/F/GR	-	0	-	SL	None	
	Ap2	37-60	10YR 3/2	Friable	W/M/SBK	-	0	-	L	None	None
	Ae	60-70	10YR 5/2	Friable	W/M/PL	-	2	Coarse gravel	L	None	None
	Bmgj	70-95	10YR 6/3	Friable	W/M/SBK	C/M/D	1	Fine gravel	SL	None	None
	Cgjkj	95-120	10YR 3/6	Firm	-	C/M/P	0	-	SCL	Weak	
GL25_10	Ap	0-20	10YR 3/2	Friable	W/M/GR	-	0	-	L	None	None
	Bm	20-31	2.5Y 5/6	Friable	W/M/SBK	-	5	Cobble	LS	None	None
	BC	31-70	2.5Y 5/4	Friable	W/M/SBK	F/F/F	0	-	CL	None	None
	Ck	70-100	2.5Y 5/4	Firm	-	C/F/F	3	Gravel	CL	Strong	None
GL25_11	LFH	4-0	-	-	-	-	-	-	-	-	-
	Ah1	0-20	10YR 2/2	Friable	W/F/SBK	-	0	-	L	None	None
	Ah2	20-29	10YR 2/2	Friable	W/M/SBK	-	0	-	L	None	None
	Bmgj	29-45	10YR 4/3	Friable	W/M/SBK	C/F/F	2	-	L	None	None
	Btgj	45-63	10YR 4/3	Friable	-	M/M/D	5	-	CL	None	None
	BC	63-64	10YR 4/3	Friable	-	C/F/D	10	-	L	Weak	None
GL25_12	Ap	0-40	10YR 2/2	Friable	W/F/GR	-	1	Gravel	L	None	None
	Btj	40-60	10YR 5/6	Firm	W/F/SBK	-	0	-	CL	None	None
	BC	60-80	10YR 4/4	Firm	-	-	0	-	CL	None	None
	Ck	80-85	10YR 5/4	Firm	-	-	0	-	CL	Moderate	None
GL25_13	Ap	0-38	10YR 2/2	Friable	W/M/SBK	-	0	-	L	None	None
	Btjgj	38-46	2.5Y 5/4	Friable	W/M/SBK	M/F/D	0	-	CL	None	None
	Bmgj	46-65	10YR 4/6	Very Friable	M/M/SBK	M/M/D	0	-	LS	None	None
	Ckgj	65-110	10YR 5/4	Firm	-	C/M/F	3	Gravel	CL	Strong	None
GL25_14	Ap	0-46	10YR 2/1	Friable	W/M/GR	-	0	-	L	None	None
	Aegj	46-55	2.5Y 5/2	Friable	W/M/PL	F/F/F	2	Gravel	SiL	None	None
	Btjg	55-105	10YR 5/3	Friable	M/F/SBK	M/F/D	0	-	CL	None	None
	BCg	105-120	10YR 4/3	Firm	-	M/M/D	0	-	SiCL	None	None

Site	Horizon	Depth (cm)	Colour	Consistence	Structure (Grade/Class/Kind)	Mottles (Abundance/Size/Contrast)	Coarse Fragments (% vol)	Coarse Fragment Type	Texture	Carbonates	Salinity
GL25_15	Ap	0-40	10YR 2/2	Friable	W/M/GR	-	0	-	L	None	None
	Btgj	40-70	10YR 4/6	Friable	W/F/SBK	F/F/F	0	-	CL	None	None
	BCgj	70-120	10YR 4/4	Friable	-	C/F/F	0	-	CL	None	None
GL25_16	Ap	0-65	10YR 2/2	Friable	W/F/GR	-	1	Gravel	L	None	None
	Btgj	65-90	10YR 4/3	Firm	W/M/SBK	C/F/F	0	-	CL	None	None
	BCgj	90-120	10YR 3/2	Firm	-	M/F/P	1	Gravel	CL	None	None
GL25_17	Ap	0-33	10YR 2/2	Friable	W/F/GR	-	0	-	L	None	None
	Ae	33-47	10YR 5/3	Friable	W/M/PL	-	0	-	FSL	None	None
	Btgj	47-70	10YR 3/3	Firm	W/M/SBK	C/F/F	0	-	CL	None	None
	Ckgj	70-80	10YR 3/3	Firm	-	C/F/F	0	-	CL	Weak	None
GL25_18	Ap	0-42	10YR 2/2	Very Friable	W/F/GR	-	0	-	L	None	None
	Btk	42-70	10YR 4/4	Friable	W/M/SBK	-	0	-	CL	Moderate	None
	Ck	70-105	10YR 5/4	Friable	-	-	0	-	SL	Strong	None
GL25_19	Ap1	0-16	10YR 3/2	Friable	W/F/GR	-	0	-	L	None	None
	Ap2	16-28	10YR 2/2	Friable	W/M/SBK	-	0	-	L	None	None
	Ae	28-40	2.5Y 5/3	Very Friable	W/M/PL	-	0	-	VFSL	None	None
	Btgj	40-95	10YR 4/4	Firm	M/M/SBK	M/F/D	5	Gravel	CL	None	None
	Ckgj	95-108	10YR 4/4	Firm	-	M/F/D	10	Gravel	CL	Moderate	None
GL25_20	Ap	0-29	10YR 2/2	Friable	W/F/GR	-	1	-	L	None	None
	Ae	29-39	10YR 5/2	Very Friable	M/F/PL	-	1	-	FSL	None	None
	Btjgj	39-60	2.5YR 4/3	Friable	M/F/SBK	F/F/F	1	-	L	None	None
	BCgj	60-85	2.5YR 5/3	Friable	-	C/F/D	1	-	SL	None	None
	Ckjgj	85-95	10YR 5/3	Friable	-	C/F/D	1	-	SL	Weak	None
GL25_21	Ap	0-24	10YR 2/2	Friable	W/F/-	-	0	-	L	None	None
	Btj	24-73	10YR 5/4	Firm	W/M/SBK	-	2	Cobble	SCL	None	None
	Cca	73-120	2.5Y 5/3	Firm	-	-	2	Gravel	SCL	Strong	None
GL25_22	Ap	0-40	10YR 2/2	Friable	W/M/GR	-	0	-	L	None	None
	Bm	40-90	10YR 4/4	Friable	W/M/SBK	-	2	Gravel	L	None	None
	Ck	90-95	2.5Y 5/4	Firm	-	-	5	Gravel	CL	Strong	None

Site	Horizon	Depth (cm)	Colour	Consistence	Structure (Grade/Class/Kind)	Mottles (Abundance/Size/Contrast)	Coarse Fragments (% vol)	Coarse Fragment Type	Texture	Carbonates	Salinity
GL25_23	Of	13-0	-	-	-	-	-	-	-	-	-
	Ap	0-29	10YR 2/1	Friable	M/M/GR	-	1	-	L	None	None
	Btg	29-45	2.5Y 3/1	Firm	W/M/SBK	C/F/P	1	-	CL	None	None
	Cg	45-70	2.5Y 4/2	Firm	-	C/M/P	1	-	C	None	None
GL25_24	LFH	4-0	-	-	-	-	-	-	-	-	-
	Ah	0-30	10YR 2/1	Friable	M/F/GR	-	0	-	L	None	None
	Ahe	30-41	2.5Y 4/2	Friable	M/M/PL	-	0	-	L	None	None
	Btg	41-75	2.5Y 3/2	Firm	W/F/SBK	M/M/P	0	-	CL	None	None
	BCg	75-120	2.5Y 4/2	Firm	-	M/M/D	0	-	SCL	None	None
GL25_25	Ap	0-29	10YR 2/2	Friable	W/F/GR	-	0	-	L	None	None
	Bt	29-45	10YR 4/3	Firm	M/F/SBK	-	0	-	SCL	None	None
	BC	45-70	10YR 4/4	Firm	-	-	1	-	SCL	None	None
GL25_26	LFH	3-0	-	-	-	-	-	-	-	-	-
	Ah	0-20	10YR 2/2	Friable	W/F/GR	-	0	-	SiL	None	None
	Btg	20-22	2.5Y 4/2	Friable	W/F/PL	-	0	-	CL	None	None
	Btgj	22-50	2.5Y 4/3	Firm	M/F/SBK	M/F/D	0	-	CL	None	None
	C	50-90	2.5Y 4/4	Firm	-	M/F/D	0	-	SCL	None	None
GL25_27	Ap	0-36	10YR 2/2	Friable	W/F/GR	-	0	-	L	None	None
	Ae	36-50	10YR 6/2	Very Friable	W/M/PL	-	0	-	VFSL	None	None
	Bt	50-65	10YR 4/4	Firm	M/F/SBK	C/F/D	0	-	CL	None	None
	BCgj	65-85	10YR 4/4	Firm	-	C/F/D	0	-	CL	None	None
	Cgj	85-95	2.5Y 4/4	Firm	-	C/F/D	0	-	CL	Very Weak	None
GL25_28	Ap	0-38	10YR 2/1	Friable	W/F/GR	-	2	Gravel	L	None	None
	Bm	38-52	10YR 4/3	Firm	M/F/SBK	-	0	-	CL	None	None
	Cca	52-70	10YR 4/4	Firm	-	-	2	Fine gravel	L	Moderate	None
GL25_29	Ap	0-32	10YR 2/2	Very Friable	W/M/SBK	-	0	-	L	None	None
	Ae	32-44	10YR 6/2	Very Friable	W/F/PL	-	0	-	FSL	None	None
	Btjgjkj	44-65	10YR 3/3	Firm	W/F/SBK	C/F/F	0	-	L	Weak	None
	BCgjkj	65-105	10YR 4/4	Firm	-	C/F/D	0	-	SCL	Weak	None
	Ck	105-110	10YR 4/4	Firm	-	-	0	-	CL	Moderate	None

Site	Horizon	Depth (cm)	Colour	Consistence	Structure (Grade/Class/Kind)	Mottles (Abundance/Size/Contrast)	Coarse Fragments (% vol)	Coarse Fragment Type	Texture	Carbonates	Salinity
GL25_30_TS	Apk	0-18	10YR 2/2	Friable	W/M/GR	-	5	Gravel	L	Strong	None
	Btk	18-30	10YR 6/2	Firm	M/C/SBK	-	5	Fine gravel	CL	Strong	None
GL25_31	Ah	0-38	10YR 2/2	Friable	W/F/GR	-	0	-	L	None	None
	Bg	38-60	2.5Y 3/2	-	-	M/M/D	0	-	L	None	None
	Cgk	60-90	2.5Y 5/2	-	-	M/M/D	0	-	FSL	Moderate	None
GL25_32_TS	LFH	2-0	-	-	-	-	-	-	-	-	-
	Ap	0-36	10YR 2/2	Friable	W/M/SBK	-	0	-	L	None	None
	Bgj	36-50	2.5Y 4/2	Friable	M/M/SBK	F/F/F	0	-	L	None	None
GL25_33_TS	Ap	0-30	10YR 2/2	Friable	W/F/GR	-	2	Coarse gravel	L	None	None
	Ae	30-47	10YR 5/2	Very Friable	W/F/PL	-	0	-	VFSL	None	None
	Bt	47-60	10YR 5/3	Firm	W/F/SBK	M/F/D	0	-	CL	None	None
GL25_34_TS	Ap	0-29	10YR 2/2	Friable	W/M/SBK	-	0	-	L	None	None
	Ae	29-46	10YR 5/3	Very Friable	M/M/PL	-	0	-	FSL	None	None
	Btgj	46-65	2.5Y 4/2	Firm	-	C/F/D	0	-	CL	None	None
GL25_35_TS	Ap	0-37	10YR 2/2	Very Friable	W/F/GR	-	0	-	L	None	None
	Ae	37-50	10YR 6/1	Friable	W/C/PL	-	0	-	FSL	None	None
	Btgj	50-60	10YR 4/2	Firm	M/M/SBK	C/F/D	0	-	CL	None	None
GL25_36_TS	Ap	0-42	10YR 2/2	Very Friable	W/F/GR	-	0	-	L	None	None
	Bm	42-50	10YR 4/3	Friable	W/M/SBK	-	0	-	L	None	None
GL25_37_TS	Ap	0-28	10YR 2/2	Very Friable	W/F/GR	-	0	-	L	Very Weak	None
	Bmk	28-40	10YR 4/4	Friable	W/M/SBK	-	0	-	L	Moderate	None
GL25_38_TS	Apk	0-42	10YR 2/2	Very Friable	W/F/GR	-	0	-	L	Moderate	None
	Bmkgj	42-60	10YR 5/2	Firm	M/M/SBK	F/F/F	0	-	L	Strong	None
GL25_39	LFH	8-0	-	-	-	-	-	-	-	-	-
	Ahk	0-50	10YR 2/2	Friable	M/M/GR	-	0	-	CL	Strong	None
	Bkgj	50-75	2.5Y 5/2	Very Friable	W/M/PL	C/F/F	2	Coarse gravel	SiC	Strong	None
	Ccagj	75-90	10YR 4/4	Firm	-	C/F/D	5	Coarse gravel	CL	Strong	None
GL25_40_TS	LFH	2-0	-	-	-	-	-	-	-	-	-
	Ahe	0-23	10YR 2/2	Very Friable	W/F/GR	-	2	Coarse gravel	L	None	None
	Bt	23-42	10YR 4/4	Firm	W/M/SBK	-	0	-	CL	None	None

Site	Horizon	Depth (cm)	Colour	Consistence	Structure (Grade/Class/Kind)	Mottles (Abundance/Size/Contrast)	Coarse Fragments (% vol)	Coarse Fragment Type	Texture	Carbonates	Salinity
GL25_41_TS	Ap1	0-35	10YR 3/2	Friable	W/F/GR	-	0	-	L	None	None
	Ap2	35-47	10YR 3/2	-	W/M/SBK	-	0	-	L	None	None
	Bm	47-55	10YR 4/3	Friable	W/M/SBK	C/F/F	0	-	L	None	None
GL25_42_TS	Ap	0-15	10YR 3/2	Friable	W/F/GR	-	1	Medium gravel	L	None	None
	Btj	15-30	10YR 5/4	Friable	W/F/SBK	-	1	Cobble	CL	None	None
GL25_43_TS	Apkj	0-42	10YR 2/2	Friable	W/F/GR	-	2	Coarse gravel	L	Weak	None
	ABk	42-50	10YR 4/2	Firm	W/M/SBK	-	2	-	L	Moderate	None
	Btjk	50-60	10YR 4/3	Firm	-	-	2	-	CL	Strong	None
GL25_44_TS	Ap	0-32	10YR 3/2	Friable	W/M/SBK	-	0	-	L	None	None
	Bm	32-50	10YR 5/4	Friable	W/M/SBK	-	0	-	VFSL	None	None
GL25_45_TS	Ap	0-26	10YR 2/2	Friable	W/F/SBK	-	0	-	L	None	None
	Ae	26-46	10YR 5/2	Friable	W/M/PL	-	0	-	VFSL	None	None
	Btg	46-55	10YR 4/2	Firm	M/M/SBK	M/M/P	0	-	CL	None	None
GL25_46_TS	Ap	0-23	10YR 2/2	-	W/M/GR	-	0	-	L	None	None
	Ae	23-38	10YR 4/3	Friable	W/M/PL	-	2	Gravel	VFSL	None	None
	Btg	38-45	10YR 3/3	Firm	M/M/SBK	F/F/D	0	-	CL	None	None
GL25_47_TS	Ap	0-46	10YR 2/2	Friable	W/M/GR	-	0	-	L	None	None
	Bm	46-65	10YR 3/6	Very Friable	W/M/SBK	-	0	-	SiL	None	None
GL25_48_TS	Ap	0-33	10YR 2/2	Friable	W/F/GR	-	0	-	L	None	None
	Ae	33-40	10YR 5/2	Friable	W/F/PL	-	0	-	SL	None	None
	Btgj	40-50	2.5Y 4/2	Friable	W/M/SBK	C/F/D	0	-	CL	None	None
GL25_49_TS	Ap	0-39	10YR 2/2	Friable	W/F/GR	-	0	-	VFSL	None	None
	Ae	39-53	10YR 6/2	Friable	W/M/PL	-	0	-	VFSL	None	None
	Bm	53-65	10YR 5/2	Friable	W/F/SBK	-	0	-	SL	None	None
GL25_50_TS	Ap	0-49	10YR 2/2	Friable	W/F/GR	-	0	-	L	None	None
	Bm	49-55	10YR 4/4	Friable	W/F/SBK	-	0	-	L	None	None
GL25_51_TS	Apkj	0-37	10YR 2/2	-	W/F/GR	-	0	-	L	Weak	None
	Bmk	37-45	10YR 4/4	Friable	W/F/SBK	-	0	-	SiCL	Strong	None
GL25_52_TS	Ap	0-27	10YR 2/2	Friable	W/C/SBK	-	0	-	L	None	None
	Bm	27-40	10YR 4/4	Friable	W/M/SBK	-	0	-	L	None	None

Site	Horizon	Depth (cm)	Colour	Consistence	Structure (Grade/Class/Kind)	Mottles (Abundance/Size/Contrast)	Coarse Fragments (% vol)	Coarse Fragment Type	Texture	Carbonates	Salinity
GL25_53_TS	LFH	4-0	-	-	-	-	-	-	-	-	-
	Ap	0-28	10YR 2/2	Friable	W/F/GR	-	0	-	L	None	None
	Btg	28-40	2.5Y 4/3	Firm	W/F/SBK	M/M/P	0	-	CL	None	None
GL25_54_TS	Ap	0-27	10YR 2/2	-	W/F/GR	-	0	-	L	None	None
	AB	27-40	10YR 3/2	-	W/F/SBK	-	0	-	CL	None	None
	Btk	40-48	10YR 5/3	Firm	-	-	0	-	CL	Moderate	None
GL25_55_TS	Ap	0-27	10YR 2/2	Friable	W/M/GR	-	0	-	L	None	None
	Apk	27-51	10YR 2/2	Friable	W/M/SBK	-	0	-	L	Weak	None
	Bmk	51-70	10YR 4/3	Friable	M/M/SBK	-	0	-	L	Moderate	None
GL25_56_TS	LFH	6-0	-	-	-	-	-	-	-	-	-
	Ah	0-28	10YR 2/2	Friable	M/M/GR	-	0	-	L	None	None
	Bg	28-40	2.5Y 4/2	Sticky	M/M/SBK	C/F/D	0	-	SiCL	None	None
GL25_57_TS	Ap	0-16	10YR 2/2	Very Friable	W/F/GR	-	0	-	L	None	None
	Apkj	16-37	10YR 2/2	Friable	W/F/GR	-	0	-	L	-	None
	Bmk	37-50	10YR 5/4	Friable	W/M/SBK	-	0	-	L	-	None
GL25_58_TS	Ap	0-30	10YR 3/2	Friable	W/F/SBK	-	2	Gravel	L	None	None
	Ae	30-38	10YR 6/2	Friable	W/M/PL	F/F/F	0	-	VFSL	None	None
	Bg	38-50	10YR 5/3	Friable	W/F/SBK	M/M/D	2	Fine gravel	SiCL	None	None
GL25_59_TS	Ap	0-35	10YR 2/2	Friable	W/F/SBK	-	0	-	L	None	None
	Ahe	35-51	10YR 2/2	Friable	W/F/PL	-	0	-	SL	None	None
	Btgj	51-66	2.5YR 4/3	Firm	-	C/F/D	0	-	SL	None	None
GL25_60_TS	Ap	0-35	10YR 2/1	Friable	M/C/GR	-	2	Gravel	L	None	None
	Btgj	35-47	10YR 3/1	Firm	M/M/SBK	C/F/D	5	Fine gravel	CL	None	None
GL25_61_TS	Ap	0-45	10YR 2/2	Friable	W/M/GR	-	0	-	L	None	None
	Btgj	45-68	10YR 3/3	Friable	W/M/SBK	C/F/D	2	Gravel	CL	None	None
GL25_62_TS	Ap1	0-23	10YR 3/2	Friable	W/M/GR	-	0	-	L	None	None
	Ap2	23-45	-	Friable	M/M/SBK	-	0	-	CL	None	None
	Bm	45-55	10YR 3/2	Firm	W/M/SBK	F/F/F	0	-	SiCL	None	None
GL25_63_TS	Ap	0-41	10YR 2/2	Friable	W/M/SBK	-	0	-	L	None	None
	Bm	41-52	10YR 4/3	Friable	W/M/SBK	-	0	-	L	None	None

Site	Horizon	Depth (cm)	Colour	Consistence	Structure (Grade/Class/Kind)	Mottles (Abundance/Size/Contrast)	Coarse Fragments (% vol)	Coarse Fragment Type	Texture	Carbonates	Salinity
GL25_64_TS	Ap	0-35	10YR 2/2	Friable	W/M/GR	-	0	-	L	None	None
	Bm	35-50	10YR 3/2	Friable	W/F/SBK	-	0	-	L	None	None
GL25_65_TS	Ap	0-34	10YR 2/2	Friable	W/F/GR	-	0	-	L	None	None
	Btj	34-40	10YR 4/4	Firm	M/F/SBK	-	0	-	CL	None	None
GL25_66_TS	Ap	0-21	10YR 3/2	Friable	W/M/GR	-	0	-	L	None	None
	Bmk	21-40	10YR 3/3	Friable	W/F/SBK	-	0	-	CL	Strong	None

Table A.3 Soil Term Key

Parent Material	
FLUV	Fluvial
GLLC	Glaciolacustrine
GLFL	Glaciofluvial
GLLC	Lacustrine Till
TILL	Till
Soil Classification	
O.BLC	Orthic Black Chernozem
CA.BLC	Calcareous Black Chernozem
E.BLC	Eluviated Black Chernozem
GL.BLC	Gleyed Black Chernozem
GLCA.BLC	Gleyed Calcareous Black Chernozem
GLE.BLC	Gleyed Eluviated Black Chernozem
GLE.DYB	Gleyed Eluviated Dystric Brunisol
O.HG	Orthic Humic Gleysol
HU.LG	Humic Luvic Gleysol
Structure Grade	
W	Weak
M	Moderate
S	Strong
Structure Class	
F	Fine
M	Medium
C	Coarse
Structure Kind	
GR	Granular
SB	Subangular Blocky
BL	Blocky
PL	Platy
SG	Single Grain
MA	Massive

Mottle Abundance	
F	Few
C	Common
M	Many
Mottle Size	
F	Fine
M	Medium
C	Coarse
Mottle Contrast	
F	Faint
D	Distinct
P	Prominent
Soil Texture	
L	Loam
LS	Loamy Sand
CL	Clay Loam
SCL	Sandy Clay Loam
SL	Sandy Loam
FSL	Fine Sandy Loam
VFSL	Very Fine Sandy Loam
SiL	Silt Loam
SiCL	Silty Clay Loam
SiC	Silty Clay

Appendix B Laboratory Data

B.1 Soil Nutrient and Chemical Laboratory Data

Your Project #: 123514064
Site#: GREENLIGHT ELECTRICITY CENTRE
Site Location: FORT SASKATCHEWAN
Your C.O.C. #: 1 OF 2

Attention: Ashley Fischer

STANTEC CONSULTING LTD
#200, 325- 25TH ST. SE
CALGARY, AB
CANADA T2A 7H8

Report Date: 2025/06/19
Report #: R3676884
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C548352
Received: 2025/05/27, 12:26

Sample Matrix: Soil
Samples Received: 20

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Cation/EC Ratio (1)	1	N/A	2025/06/03		Auto Calc
Cation/EC Ratio (1)	14	N/A	2025/06/05		Auto Calc
Cation/EC Ratio (1)	4	N/A	2025/06/06		Auto Calc
Calcium Carbonate Equivalent (1)	13	N/A	2025/06/12	AB SOP-00019	Carter 2nd ed 20.2 m
Cation Exchange Capacity (1, 2)	7	2025/05/28	2025/06/19		Auto Calc
Cation Exchange Capacity (1, 2)	1	2025/05/29	2025/06/19		Auto Calc
Chloride (Soluble) (1)	2	2025/06/02	2025/06/03	AB SOP-00033 / AB SOP-00020	SM 24-4500-Cl-E m
Chloride (Soluble) (1)	14	2025/06/05	2025/06/05	AB SOP-00033 / AB SOP-00020	SM 24-4500-Cl-E m
Chloride (Soluble) (1)	4	2025/06/06	2025/06/06	AB SOP-00033 / AB SOP-00020	SM 24-4500-Cl-E m
Conductivity @25C (Soluble) (1)	1	2025/06/02	2025/06/03	AB SOP-00033 / AB SOP-00004	SM 24 2510 B m
Conductivity @25C (Soluble) (1)	14	2025/06/05	2025/06/05	AB SOP-00033 / AB SOP-00004	SM 24 2510 B m
Conductivity @25C (Soluble) (1)	2	2025/06/05	2025/06/06	AB SOP-00033 / AB SOP-00004	SM 24 2510 B m
Conductivity @25C (Soluble) (1)	2	2025/06/06	2025/06/06	AB SOP-00033 / AB SOP-00004	SM 24 2510 B m
Sum of Cations, Anions (1)	2	N/A	2025/06/03		Auto Calc
Sum of Cations, Anions (1)	14	N/A	2025/06/05		Auto Calc
Sum of Cations, Anions (1)	4	N/A	2025/06/06		Auto Calc
Moisture (1)	1	N/A	2025/06/10	AB SOP-00002	CCME PHC-CWS m
Moisture (1)	7	N/A	2025/06/09	AB SOP-00002	CCME PHC-CWS m
Available(10:1) Wet NO2(N);NO2(N)+NO3(N) (1)	8	2025/06/16	2025/06/17	AB SOP-00091	SM 24 4500 NO3m
NO3 (N) Available (10:1) Wet (1)	8	2025/06/05	2025/06/17		Auto Calc
pH @25C (1:2 Calcium Chloride Extract) (1)	2	2025/06/02	2025/06/02	CAL SOP-00180 / AB SOP-00006	SM 24 4500 H+B m
pH @25C (1:2 Calcium Chloride Extract) (1)	18	2025/06/03	2025/06/03	CAL SOP-00180 / AB SOP-00006	SM 24 4500 H+B m
Sodium Adsorption Ratio (1)	2	N/A	2025/06/03		Auto Calc
Sodium Adsorption Ratio (1)	14	N/A	2025/06/05		Auto Calc

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

Your Project #: 123514064
Site#: GREENLIGHT ELECTRICITY CENTRE
Site Location: FORT SASKATCHEWAN
Your C.O.C. #: 1 OF 2

Attention: Ashley Fischer

STANTEC CONSULTING LTD
#200, 325- 25TH ST. SE
CALGARY, AB
CANADA T2A 7H8

Report Date: 2025/06/19
Report #: R3676884
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C548352
Received: 2025/05/27, 12:26

Sample Matrix: Soil
Samples Received: 20

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sodium Adsorption Ratio (1)	4	N/A	2025/06/06		Auto Calc
Soluble Ions (1)	2	2025/06/02	2025/06/03	AB SOP-00033 / AB SOP-00042	EPA 6010d R5 m
Soluble Ions (1)	14	2025/06/05	2025/06/05	AB SOP-00033 / AB SOP-00042	EPA 6010d R5 m
Soluble Ions (1)	4	2025/06/06	2025/06/06	AB SOP-00033 / AB SOP-00042	EPA 6010d R5 m
Soluble Paste (1)	2	2025/06/02	2025/06/02	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Paste (1)	14	2025/06/05	2025/06/05	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Paste (1)	4	2025/06/06	2025/06/06	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Ions Calculation (1)	2	N/A	2025/06/02		Auto Calc
Soluble Ions Calculation (1)	18	N/A	2025/06/03		Auto Calc
Total Organic Carbon LECO Method (1)	9	N/A	2025/06/03	CAL SOP-00243	LECO 203-821-498 m
Texture by Hydrometer (1)	19	N/A	2025/06/03	AB SOP-00030	Carter 2nd ed 55.3 m
Texture by Hydrometer (1)	1	N/A	2025/06/04	AB SOP-00030	Carter 2nd ed 55.3 m
Texture Class (1)	19	N/A	2025/06/03		Auto Calc
Texture Class (1)	1	N/A	2025/06/04		Auto Calc
Theoretical Gypsum Requirement (1, 3)	2	N/A	2025/06/03		Auto Calc
Theoretical Gypsum Requirement (1, 3)	14	N/A	2025/06/05		Auto Calc
Theoretical Gypsum Requirement (1, 3)	4	N/A	2025/06/06		Auto Calc
Total Kjeldahl Nitrogen (Available) (1)	8	N/A	2025/06/17		Auto Calc
Nitrogen (Total Available) (1)	1	2025/05/29	2025/06/02	AB SOP-00093	SM 24 4500-N C m
Nitrogen (Total Available) (1)	7	2025/05/30	2025/06/02	AB SOP-00093	SM 24 4500-N C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

Your Project #: 123514064
Site#: GREENLIGHT ELECTRICITY CENTRE
Site Location: FORT SASKATCHEWAN
Your C.O.C. #: 1 OF 2

Attention: Ashley Fischer

STANTEC CONSULTING LTD
#200, 325- 25TH ST. SE
CALGARY, AB
CANADA T2A 7H8

Report Date: 2025/06/19
Report #: R3676884
Version: 3 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C548352
Received: 2025/05/27, 12:26

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary, 4000 - 19 St. , Calgary, AB, T2E 6P8
(2) Sample(s) analyzed using accredited methodologies and have been subjected to Bureau Veritas's standard validation process for the submitted matrix however this is not accredited for this matrix.
(3) TGR calculation is based on a theoretical SAR of 4. Salt Contamination and Assessment and remediation guideline 2001 recommended SAR is ranging 4-8. TGR is reported in tonnes/ha.

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas
19 Jun 2025 14:55:07

Please direct all questions regarding this Certificate of Analysis to:
Geraldlyn Gouthro, Key Account Specialist
Email: geraldlyn.gouthro@bureauveritas.com
Phone# (780) 577-7100

==========

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.

Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		DLV834		DLV835	DLV835		DLV836		
Sampling Date		2025/05/23 09:00		2025/05/23 09:00	2025/05/23 09:00		2025/05/23 09:00		
COC Number		1 OF 2		1 OF 2	1 OF 2		1 OF 2		
	UNITS	GL25_09 AP1	RDL	GL25_09 AP2	GL25_09 AP2 Lab-Dup	RDL	GL25_09 AE	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	2.0	N/A	1.2	N/A	N/A	3.9	N/A	B964870
Cation Sum	meq/L	4.1	N/A	3.6	N/A	N/A	5.6	N/A	B964870
Cation/EC Ratio	N/A	9.2	0.10	8.6	N/A	0.10	9.4	0.10	B964861
Calculated Calcium (Ca)	mg/kg	23	1.5	26	N/A	2.0	18	0.95	B964940
Calculated Magnesium (Mg)	mg/kg	4.3	1.0	7.3	N/A	1.3	6.0	0.63	B964940
Calculated Sodium (Na)	mg/kg	12	1.5	11	N/A	2.0	8.1	0.95	B964940
Calculated Potassium (K)	mg/kg	3.0	1.0	<1.3	N/A	1.3	0.70	0.63	B964940
Calculated Chloride (Cl)	mg/kg	17	5.1	11	N/A	6.7	4.5	3.2	B964940
Calculated Sulphate (SO4)	mg/kg	27	3.0	24	N/A	4.0	53	1.9	B964940
Soluble Parameters									
Soluble Chloride (Cl)	mg/L	33	10	17	19	10	14	10	B975693
Soluble Conductivity	dS/m	0.45	0.020	0.41	0.46	0.020	0.60	0.020	B975691
Soluble (CaCl2) pH	pH	4.90	N/A	5.62	N/A	N/A	5.96	N/A	B969758
Sodium Adsorption Ratio	N/A	0.81	0.10	0.59	N/A	0.10	0.75	0.10	B964936
Soluble Calcium (Ca)	mg/L	46	3.0	39	41	3.0	57	3.0	B975702
Soluble Magnesium (Mg)	mg/L	8.6	2.0	11	11	2.0	19	2.0	B975702
Soluble Sodium (Na)	mg/L	23	3.0	16	19	3.0	26	3.0	B975702
Soluble Potassium (K)	mg/L	6.0	2.0	<2.0	<2.0	2.0	2.2	2.0	B975702
Saturation %	%	51	N/A	67	62	N/A	32	N/A	B969757
Soluble Sulphate (SO4)	mg/L	53	6.0	36	39	6.0	170	6.0	B975702
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	<0.20	N/A	0.20	<0.20	0.20	B964877

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Edmonton: 4326 76 Avenue NW T6B 2H8 Telephone (780)577-7100 Fax (780)450-4187

Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		DLV837			DLV838			DLV839		
Sampling Date		2025/05/23 09:00			2025/05/23 09:00			2025/05/24 09:00		
COC Number		1 OF 2			1 OF 2			1 OF 2		
	UNITS	GL25_09 BMGJ	RDL	QC Batch	GL25_09 IICGJKJ	RDL	QC Batch	GL25_18 AP	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	1.9	N/A	B964870	2.4	N/A	B964870	1.6	N/A	B964870
Cation Sum	meq/L	3.4	N/A	B964870	4.0	N/A	B964870	7.6	N/A	B964870
Cation/EC Ratio	N/A	8.7	0.10	B964861	11	0.10	B964861	8.9	0.10	B964861
Calculated Calcium (Ca)	mg/kg	5.7	0.68	B964940	5.7	0.86	B964940	48	1.9	B964940
Calculated Magnesium (Mg)	mg/kg	1.8	0.45	B964940	2.6	0.57	B964940	13	1.3	B964940
Calculated Sodium (Na)	mg/kg	7.0	0.68	B964940	13	0.86	B964940	28	1.9	B964940
Calculated Potassium (K)	mg/kg	0.80	0.45	B964940	3.2	0.57	B964940	1.5	1.3	B964940
Calculated Chloride (Cl)	mg/kg	2.5	2.3	B964940	6.5	2.9	B964940	16	6.3	B964940
Calculated Sulphate (SO4)	mg/kg	17	1.4	B964940	24	1.7	B964940	28	3.8	B964940
Soluble Parameters										
Soluble Chloride (Cl)	mg/L	11	10	B975693	23	10	B971669	26	10	B975693
Soluble Conductivity	dS/m	0.38	0.020	B975691	0.38	0.020	B971666	0.85	0.020	B975691
Soluble (CaCl2) pH	pH	5.61	N/A	B969758	5.90	N/A	B969597	5.13	N/A	B969758
Sodium Adsorption Ratio	N/A	1.4	0.10	B964936	2.1	0.10	B964936	1.2	0.10	B964936
Soluble Calcium (Ca)	mg/L	25	3.0	B975702	20	3.0	B971800	76	3.0	B975702
Soluble Magnesium (Mg)	mg/L	8.0	2.0	B975702	9.0	2.0	B971800	21	2.0	B975702
Soluble Sodium (Na)	mg/L	31	3.0	B975702	46	3.0	B971800	45	3.0	B975702
Soluble Potassium (K)	mg/L	3.5	2.0	B975702	11	2.0	B971800	2.3	2.0	B975702
Saturation %	%	23	N/A	B969757	29	N/A	B969596	63	N/A	B969757
Soluble Sulphate (SO4)	mg/L	75	6.0	B975702	84	6.0	B971800	44	6.0	B975702
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	B964877	<0.20	0.20	B964877	<0.20	0.20	B964877

RDL = Reportable Detection Limit
N/A = Not Applicable

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Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		DLV840		DLV841		DLV842			DLV843		
Sampling Date		2025/05/24 09:00		2025/05/24 09:00		2025/05/23 09:00			2025/05/23 09:00		
COC Number		1 OF 2		1 OF 2		1 OF 2			1 OF 2		
	UNITS	GL25_18 BMK	RDL	GL25_18 CK	RDL	GL25_21 AP	RDL	QC Batch	GL25_21 BTJ	RDL	QC Batch
Calculated Parameters											
Anion Sum	meq/L	1.3	N/A	2.2	N/A	3.7	N/A	B964870	0.76	N/A	B964870
Cation Sum	meq/L	4.5	N/A	8.1	N/A	9.9	N/A	B964870	3.0	N/A	B964870
Cation/EC Ratio	N/A	9.1	0.10	9.8	0.10	8.2	0.10	B964861	9.8	0.10	B964861
Calculated Calcium (Ca)	mg/kg	17	1.6	6.4	0.97	68	1.5	B964940	12	1.1	B964940
Calculated Magnesium (Mg)	mg/kg	6.8	1.1	2.2	0.65	13	1.0	B964940	2.7	0.75	B964940
Calculated Sodium (Na)	mg/kg	24	1.6	49	0.97	11	1.5	B964940	6.1	1.1	B964940
Calculated Potassium (K)	mg/kg	<1.1	1.1	0.69	0.65	6.4	1.0	B964940	0.78	0.75	B964940
Calculated Chloride (Cl)	mg/kg	13	5.4	4.3	3.2	47	5.1	B964940	3.8	3.7	B964940
Calculated Sulphate (SO4)	mg/kg	15	3.2	29	1.9	27	3.1	B964940	8.4	2.2	B964940
Soluble Parameters											
Soluble Chloride (Cl)	mg/L	25	10	13	10	91	10	B975693	10	10	B977237
Soluble Conductivity	dS/m	0.50	0.020	0.83	0.020	1.2	0.020	B975691	0.31	0.020	B977000
Soluble (CaCl2) pH	pH	7.45	N/A	7.59	N/A	4.84	N/A	B969758	6.52	N/A	B969758
Sodium Adsorption Ratio	N/A	1.7	0.10	7.5	0.10	0.43	0.10	B964936	0.68	0.10	B964936
Soluble Calcium (Ca)	mg/L	31	3.0	20	3.0	130	3.0	B975702	32	3.0	B977238
Soluble Magnesium (Mg)	mg/L	13	2.0	6.6	2.0	25	2.0	B975702	7.3	2.0	B977238
Soluble Sodium (Na)	mg/L	44	3.0	150	3.0	21	3.0	B975702	16	3.0	B977238
Soluble Potassium (K)	mg/L	<2.0	2.0	2.1	2.0	13	2.0	B975702	2.1	2.0	B977238
Saturation %	%	54	N/A	32	N/A	51	N/A	B969757	37	N/A	B976619
Soluble Sulphate (SO4)	mg/L	27	6.0	89	6.0	52	6.0	B975702	23	6.0	B977238
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	0.21	0.20	<0.20	0.20	B964877	<0.20	0.20	B964877

RDL = Reportable Detection Limit
N/A = Not Applicable

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SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		DLV844			DLV845		DLV846		
Sampling Date		2025/05/23 09:00			2025/05/24 09:00		2025/05/24 09:00		
COC Number		1 OF 2			1 OF 2		1 OF 2		
	UNITS	GL25_21 CCA	RDL	QC Batch	GL25_24 AH	RDL	GL25_24 AHE	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	1.7	N/A	B964870	5.0	N/A	3.8	N/A	B964870
Cation Sum	meq/L	8.0	N/A	B964870	11	N/A	6.6	N/A	B964870
Cation/EC Ratio	N/A	11	0.10	B964861	9.4	0.10	9.5	0.10	B964861
Calculated Calcium (Ca)	mg/kg	51	1.5	B964940	75	2.4	10	0.75	B964940
Calculated Magnesium (Mg)	mg/kg	11	0.98	B964940	19	1.6	3.4	0.50	B964940
Calculated Sodium (Na)	mg/kg	10	1.5	B964940	73	2.4	19	0.75	B964940
Calculated Potassium (K)	mg/kg	2.1	0.98	B964940	<1.6	1.6	0.66	0.50	B964940
Calculated Chloride (Cl)	mg/kg	<4.9	4.9	B964940	41	7.9	12	2.5	B964940
Calculated Sulphate (SO4)	mg/kg	41	2.9	B964940	130	4.7	29	1.5	B964940
Soluble Parameters									
Soluble Chloride (Cl)	mg/L	<10	10	B977237	52	10	49	10	B975693
Soluble Conductivity	dS/m	0.76	0.020	B977000	1.1	0.020	0.69	0.020	B975691
Soluble (CaCl2) pH	pH	7.41	N/A	B969758	5.67	N/A	6.02	N/A	B969758
Sodium Adsorption Ratio	N/A	0.49	0.10	B964936	2.2	0.10	2.7	0.10	B964936
Soluble Calcium (Ca)	mg/L	100	3.0	B977238	95	3.0	40	3.0	B975702
Soluble Magnesium (Mg)	mg/L	21	2.0	B977238	23	2.0	13	2.0	B975702
Soluble Sodium (Na)	mg/L	21	3.0	B977238	92	3.0	78	3.0	B975702
Soluble Potassium (K)	mg/L	4.4	2.0	B977238	<2.0	2.0	2.6	2.0	B975702
Saturation %	%	49	N/A	B976619	79	N/A	25	N/A	B969757
Soluble Sulphate (SO4)	mg/L	84	6.0	B977238	170	6.0	120	6.0	B975702
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	B964877	<0.20	0.20	<0.20	0.20	B964877

RDL = Reportable Detection Limit
N/A = Not Applicable

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SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		DLV847		DLV848		DLV848		DLV849		
Sampling Date		2025/05/24 09:00		2025/05/24 09:00		2025/05/24 09:00		2025/05/25 09:00		
COC Number		1 OF 2		1 OF 2		1 OF 2		1 OF 2		
	UNITS	GL25_24 BTG	RDL	GL25_24 BCG	RDL	GL25_24 BCG Lab-Dup	QC Batch	GL25_26 AH	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	4.8	N/A	0.37	N/A	N/A	B965241	1.5	N/A	B965241
Cation Sum	meq/L	7.5	N/A	1.2	N/A	N/A	B965241	3.0	N/A	B965241
Cation/EC Ratio	N/A	10	0.10	9.0	0.10	N/A	B965239	9.8	0.10	B965239
Calculated Calcium (Ca)	mg/kg	16	1.2	1.3	0.97	N/A	B965280	13	2.1	B965280
Calculated Magnesium (Mg)	mg/kg	4.5	0.83	<0.65	0.65	N/A	B965280	2.5	1.4	B965280
Calculated Sodium (Na)	mg/kg	44	1.2	7.5	0.97	N/A	B965280	23	2.1	B965280
Calculated Potassium (K)	mg/kg	<0.83	0.83	<0.65	0.65	N/A	B965280	7.6	1.4	B965280
Calculated Chloride (Cl)	mg/kg	27	4.1	<3.2	3.2	N/A	B965280	9.5	6.9	B965280
Calculated Sulphate (SO4)	mg/kg	57	2.5	5.7	1.9	N/A	B965280	38	4.2	B965280
Soluble Parameters										
Soluble Chloride (Cl)	mg/L	66	10	<10	10	N/A	B977237	14	10	B975693
Soluble Conductivity	dS/m	0.75	0.020	0.14	0.020	N/A	B976589	0.30	0.020	B975691
Soluble (CaCl2) pH	pH	5.95	N/A	5.76	N/A	5.78	B969758	5.19	N/A	B969758
Sodium Adsorption Ratio	N/A	3.9	0.10	3.2	0.10	N/A	B964936	1.9	0.10	B964936
Soluble Calcium (Ca)	mg/L	38	3.0	4.0	3.0	N/A	B977238	18	3.0	B975702
Soluble Magnesium (Mg)	mg/L	11	2.0	<2.0	2.0	N/A	B977238	3.6	2.0	B975702
Soluble Sodium (Na)	mg/L	110	3.0	23	3.0	N/A	B977238	33	3.0	B975702
Soluble Potassium (K)	mg/L	<2.0	2.0	<2.0	2.0	N/A	B977238	11	2.0	B975702
Saturation %	%	41	N/A	32	N/A	N/A	B976619	69	N/A	B969757
Soluble Sulphate (SO4)	mg/L	140	6.0	18	6.0	N/A	B977238	54	6.0	B975702
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	<0.20	0.20	N/A	B965306	<0.20	0.20	B965306

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		DLV850			DLV851			DLV852		
Sampling Date		2025/05/25 09:00			2025/05/25 09:00			2025/05/24 09:00		
COC Number		1 OF 2			1 OF 2			1 OF 2		
	UNITS	GL25_26 BTG	RDL	QC Batch	GL25_26 CG	RDL	QC Batch	GL25_34_TS BTGJ	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	4.8	N/A	B965241	1.7	N/A	B965241	6.2	N/A	B965241
Cation Sum	meq/L	7.5	N/A	B965241	3.7	N/A	B965241	11	N/A	B965241
Cation/EC Ratio	N/A	9.9	0.10	B965239	17	0.10	B965239	N/A	0.10	B965239
Calculated Calcium (Ca)	mg/kg	16	1.3	B965280	4.0	1.1	B965280	24	2.6	B965280
Calculated Magnesium (Mg)	mg/kg	5.1	0.86	B965280	4.3	0.76	B965280	5.2	1.7	B965280
Calculated Sodium (Na)	mg/kg	44	1.3	B965280	17	1.1	B965280	68	2.6	B965280
Calculated Potassium (K)	mg/kg	3.8	0.86	B965280	5.4	0.76	B965280	<1.7	1.7	B965280
Calculated Chloride (Cl)	mg/kg	36	4.3	B965280	14	3.8	B965280	13	8.6	B965280
Calculated Sulphate (SO4)	mg/kg	51	2.6	B965280	13	2.3	B965280	110	5.2	B965280
Soluble Parameters										
Soluble Chloride (Cl)	mg/L	82	10	B975693	37	10	B975693	31 (1)	20	B971669
Soluble Conductivity	dS/m	0.76	0.020	B975691	0.22	0.020	B975691	N/A	N/A	N/A
Soluble (CaCl2) pH	pH	6.92	N/A	B969758	6.79	N/A	B969758	6.73	N/A	B969597
Sodium Adsorption Ratio	N/A	3.8	0.10	B964936	2.2	0.10	B965261	5.0	0.10	B965261
Soluble Calcium (Ca)	mg/L	37	3.0	B975702	11	3.0	B975702	56	6.0	B971800
Soluble Magnesium (Mg)	mg/L	12	2.0	B975702	11	2.0	B975702	12	4.0	B971800
Soluble Sodium (Na)	mg/L	100	3.0	B975702	44	3.0	B975702	160	6.0	B971800
Soluble Potassium (K)	mg/L	8.7	2.0	B975702	14	2.0	B975702	<4.0	4.0	B971800
Saturation %	%	43	N/A	B969757	38	N/A	B969757	43	N/A	B969596
Soluble Sulphate (SO4)	mg/L	120	6.0	B975702	34	6.0	B975702	250	12	B971800
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	B965306	<0.20	0.20	B965306	<0.20	0.20	B965306

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to sample matrix.

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SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		DLV853		
Sampling Date		2025/05/25 09:00		
COC Number		1 OF 2		
	UNITS	GL25_25 BC	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	1.7	N/A	B965241
Cation Sum	meq/L	9.8	N/A	B965241
Cation/EC Ratio	N/A	21	0.10	B965239
Calculated Calcium (Ca)	mg/kg	13	1.4	B965280
Calculated Magnesium (Mg)	mg/kg	17	0.90	B965280
Calculated Sodium (Na)	mg/kg	47	1.4	B965280
Calculated Potassium (K)	mg/kg	12	0.90	B965280
Calculated Chloride (Cl)	mg/kg	17	4.5	B965280
Calculated Sulphate (SO4)	mg/kg	15	2.7	B965280
Soluble Parameters				
Soluble Chloride (Cl)	mg/L	37	10	B975693
Soluble Conductivity	dS/m	0.47	0.020	B975691
Soluble (CaCl2) pH	pH	6.82	N/A	B969758
Sodium Adsorption Ratio	N/A	3.0	0.10	B965261
Soluble Calcium (Ca)	mg/L	29	3.0	B975702
Soluble Magnesium (Mg)	mg/L	38	2.0	B975702
Soluble Sodium (Na)	mg/L	100	3.0	B975702
Soluble Potassium (K)	mg/L	27	2.0	B975702
Saturation %	%	45	N/A	B969757
Soluble Sulphate (SO4)	mg/L	34	6.0	B975702
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	B965306

RDL = Reportable Detection Limit
N/A = Not Applicable

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Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

RESULTS OF CHEMICAL ANALYSES OF SOIL

Bureau Veritas ID		DLV834		DLV835	DLV836	DLV837		
Sampling Date		2025/05/23 09:00		2025/05/23 09:00	2025/05/23 09:00	2025/05/23 09:00		
COC Number		1 OF 2		1 OF 2	1 OF 2	1 OF 2		
	UNITS	GL25_09 AP1	QC Batch	GL25_09 AP2	GL25_09 AE	GL25_09 BMGJ	RDL	QC Batch
Calculated Parameters								
Available (KCl) Nitrate (N)	mg/kg	37	B976021	<20	<20	N/A	20	B976021
Elements								
Cation exchange capacity	cmol+/Kg	12	B965237	20	<10	N/A	10	B965238
Nutrients								
Available (KCl) Total Kjeldahl Nitrogen (Calc)	mg/kg	34	B965308	<20	<20	N/A	20	B965308
Available (KCl) Total Nitrogen (N)	mg/kg	71	B967702	<10	<10	N/A	10	B967702
Available (KCl) Nitrite (N)	mg/kg	<10	B989336	<10	<10	N/A	10	B989336
Soil Properties								
Calcium Carbonate Equivalent	%	N/A	N/A	N/A	N/A	<0.60	0.60	B982956

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas ID		DLV838	DLV839	DLV840	DLV841	DLV842		
Sampling Date		2025/05/23 09:00	2025/05/24 09:00	2025/05/24 09:00	2025/05/24 09:00	2025/05/23 09:00		
COC Number		1 OF 2	1 OF 2	1 OF 2	1 OF 2	1 OF 2		
	UNITS	GL25_09 IICGJKJ	GL25_18 AP	GL25_18 BMK	GL25_18 CK	GL25_21 AP	RDL	QC Batch
Calculated Parameters								
Available (KCl) Nitrate (N)	mg/kg	N/A	34	N/A	N/A	36	20	B976021
Elements								
Cation exchange capacity	cmol+/Kg	N/A	25	N/A	N/A	18	10	B965238
Nutrients								
Available (KCl) Total Kjeldahl Nitrogen (Calc)	mg/kg	N/A	<20	N/A	N/A	24	20	B965308
Available (KCl) Total Nitrogen (N)	mg/kg	N/A	45	N/A	N/A	60	10	B967702
Available (KCl) Nitrite (N)	mg/kg	N/A	<10	N/A	N/A	<10	10	B989336
Soil Properties								
Calcium Carbonate Equivalent	%	<0.60	0.66	1.1	3.6	N/A	0.60	B982956

RDL = Reportable Detection Limit
N/A = Not Applicable

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Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

RESULTS OF CHEMICAL ANALYSES OF SOIL

Bureau Veritas ID		DLV843	DLV844	DLV845	DLV846	DLV846		
Sampling Date		2025/05/23 09:00	2025/05/23 09:00	2025/05/24 09:00	2025/05/24 09:00	2025/05/24 09:00		
COC Number		1 OF 2	1 OF 2	1 OF 2	1 OF 2	1 OF 2		
	UNITS	GL25_21 BTJ	GL25_21 CCA	GL25_24 AH	GL25_24 AHE	GL25_24 AHE Lab-Dup	RDL	QC Batch
Calculated Parameters								
Available (KCl) Nitrate (N)	mg/kg	N/A	N/A	28	<20	N/A	20	B976021
Elements								
Cation exchange capacity	cmol+/Kg	N/A	N/A	28	<10	N/A	10	B965238
Nutrients								
Available (KCl) Total Kjeldahl Nitrogen (Calc)	mg/kg	N/A	N/A	<20	<20	N/A	20	B965308
Available (KCl) Total Nitrogen (N)	mg/kg	N/A	N/A	31	<10	<10	10	B967702
Available (KCl) Nitrite (N)	mg/kg	N/A	N/A	<10	<10	<10	10	B989336
Soil Properties								
Calcium Carbonate Equivalent	%	<0.60	3.2	N/A	N/A	N/A	0.60	B982956

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas ID		DLV847	DLV848	DLV849	DLV850	DLV851		
Sampling Date		2025/05/24 09:00	2025/05/24 09:00	2025/05/25 09:00	2025/05/25 09:00	2025/05/25 09:00		
COC Number		1 OF 2	1 OF 2	1 OF 2	1 OF 2	1 OF 2		
	UNITS	GL25_24 BTG	GL25_24 BCG	GL25_26 AH	GL25_26 BTG	GL25_26 CG	RDL	QC Batch
Calculated Parameters								
Available (KCl) Nitrate (N)	mg/kg	N/A	N/A	<20	N/A	N/A	20	B976021
Elements								
Cation exchange capacity	cmol+/Kg	N/A	N/A	15	N/A	N/A	10	B965238
Nutrients								
Available (KCl) Total Kjeldahl Nitrogen (Calc)	mg/kg	N/A	N/A	<20	N/A	N/A	20	B965308
Available (KCl) Total Nitrogen (N)	mg/kg	N/A	N/A	<10	N/A	N/A	10	B967702
Available (KCl) Nitrite (N)	mg/kg	N/A	N/A	<10	N/A	N/A	10	B989336
Soil Properties								
Calcium Carbonate Equivalent	%	<0.60	<0.60	N/A	0.64	0.66	0.60	B982956

RDL = Reportable Detection Limit
N/A = Not Applicable

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Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

RESULTS OF CHEMICAL ANALYSES OF SOIL

Bureau Veritas ID		DLV851	DLV852	DLV853		
Sampling Date		2025/05/25 09:00	2025/05/24 09:00	2025/05/25 09:00		
COC Number		1 OF 2	1 OF 2	1 OF 2		
	UNITS	GL25_26 CG Lab-Dup	GL25_34_TS BTGJ	GL25_25 BC	RDL	QC Batch
Soil Properties						
Calcium Carbonate Equivalent	%	0.67	0.63	0.80	0.60	B982956

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

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PHYSICAL TESTING (SOIL)

Bureau Veritas ID		DLV834	DLV835	DLV836	DLV837		DLV838		
Sampling Date		2025/05/23 09:00	2025/05/23 09:00	2025/05/23 09:00	2025/05/23 09:00		2025/05/23 09:00		
COC Number		1 OF 2	1 OF 2	1 OF 2	1 OF 2		1 OF 2		
	UNITS	GL25_09 AP1	GL25_09 AP2	GL25_09 AE	GL25_09 BMGJ	QC Batch	GL25_09 IICGJKJ	RDL	QC Batch
Physical Properties									
% sand by hydrometer	%	54	47	46	78	B971768	66	2.0	B973365
% silt by hydrometer	%	33	44	43	12	B971768	9.8	2.0	B973365
Clay Content	%	13	9.3	11	11	B971768	24	2.0	B973365
Texture	N/A	SANDY LOAM	LOAM	LOAM	SANDY LOAM	B964620	SNDY CL LO	N/A	B964620
Moisture	%	14	20	10	N/A	B978716	N/A	0.30	N/A

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas ID		DLV838		DLV839	DLV840	DLV841	DLV842		
Sampling Date		2025/05/23 09:00		2025/05/24 09:00	2025/05/24 09:00	2025/05/24 09:00	2025/05/23 09:00		
COC Number		1 OF 2		1 OF 2	1 OF 2	1 OF 2	1 OF 2		
	UNITS	GL25_09 IICGJKJ Lab-Dup	QC Batch	GL25_18 AP	GL25_18 BMK	GL25_18 CK	GL25_21 AP	RDL	QC Batch
Physical Properties									
% sand by hydrometer	%	65	B973365	48	30	72	50	2.0	B971768
% silt by hydrometer	%	11	B973365	35	41	12	31	2.0	B971768
Clay Content	%	24	B973365	18	29	16	19	2.0	B971768
Texture	N/A	N/A	B964620	LOAM	CLAY LOAM	SANDY LOAM	LOAM	N/A	B964620
Moisture	%	N/A	N/A	17	N/A	N/A	14	0.30	B978716

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

PHYSICAL TESTING (SOIL)

Bureau Veritas ID		DLV843	DLV844	DLV845	DLV846	DLV846	DLV847		
Sampling Date		2025/05/23 09:00	2025/05/23 09:00	2025/05/24 09:00	2025/05/24 09:00	2025/05/24 09:00	2025/05/24 09:00		
COC Number		1 OF 2	1 OF 2	1 OF 2	1 OF 2	1 OF 2	1 OF 2		
	UNITS	GL25_21 BTJ	GL25_21 CCA	GL25_24 AH	GL25_24 AHE	GL25_24 AHE Lab-Dup	GL25_24 BTG	RDL	QC Batch
Physical Properties									
% sand by hydrometer	%	46	48	42	35	N/A	32	2.0	B971768
% silt by hydrometer	%	25	25	49	45	N/A	35	2.0	B971768
Clay Content	%	29	27	9.2	21	N/A	34	2.0	B971768
Texture	N/A	SNDY CL LO	SNDY CL LO	LOAM	LOAM	N/A	CLAY LOAM	N/A	B964620
Moisture	%	N/A	N/A	34	16	16	N/A	0.30	B978716

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas ID		DLV848	DLV849		DLV850	DLV851		
Sampling Date		2025/05/24 09:00	2025/05/25 09:00		2025/05/25 09:00	2025/05/25 09:00		
COC Number		1 OF 2	1 OF 2		1 OF 2	1 OF 2		
	UNITS	GL25_24 BCG	GL25_26 AH	QC Batch	GL25_26 BTG	GL25_26 CG	RDL	QC Batch
Physical Properties								
% sand by hydrometer	%	62	32	B971768	27	49	2.0	B971768
% silt by hydrometer	%	14	54	B971768	35	21	2.0	B971768
Clay Content	%	24	14	B971768	39	30	2.0	B971768
Texture	N/A	SNDY CL LO	SILT LOAM	B964620	CLAY LOAM	SNDY CL LO	N/A	B965299
Moisture	%	N/A	23	B978716	N/A	N/A	0.30	N/A

RDL = Reportable Detection Limit
N/A = Not Applicable

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PHYSICAL TESTING (SOIL)

Bureau Veritas ID		DLV852	DLV853		
Sampling Date		2025/05/24 09:00	2025/05/25 09:00		
COC Number		1 OF 2	1 OF 2		
	UNITS	GL25_34_TS BTGJ	GL25_25 BC	RDL	QC Batch
Physical Properties					
% sand by hydrometer	%	30	58	2.0	B971768
% silt by hydrometer	%	35	14	2.0	B971768
Clay Content	%	35	28	2.0	B971768
Texture	N/A	CLAY LOAM	SNDY CL LO	N/A	B965299

RDL = Reportable Detection Limit
N/A = Not Applicable

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Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

MISCELLANEOUS (SOIL)

Bureau Veritas ID		DLV834	DLV835	DLV836	DLV839	DLV842	DLV843	DLV845		
Sampling Date		2025/05/23 09:00	2025/05/23 09:00	2025/05/23 09:00	2025/05/24 09:00	2025/05/23 09:00	2025/05/23 09:00	2025/05/24 09:00		
COC Number		1 OF 2	1 OF 2	1 OF 2	1 OF 2	1 OF 2	1 OF 2	1 OF 2		
	UNITS	GL25_09 AP1	GL25_09 AP2	GL25_09 AE	GL25_18 AP	GL25_21 AP	GL25_21 BTJ	GL25_24 AH	RDL	QC Batch
Misc. Inorganics										
Total Organic Carbon (C)	%	3.7	3.2	0.20	3.0	3.2	0.43	5.9	0.050	B969949
RDL = Reportable Detection Limit										

Bureau Veritas ID		DLV846	DLV849		
Sampling Date		2025/05/24 09:00	2025/05/25 09:00		
COC Number		1 OF 2	1 OF 2		
	UNITS	GL25_24 AHE	GL25_26 AH	RDL	QC Batch
Misc. Inorganics					
Total Organic Carbon (C)	%	0.37	3.1	0.050	B969949
RDL = Reportable Detection Limit					

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	24.7°C

Sample DLV838 [GL25_09 IICGJKJ] : SNDY CL LO = SANDY CLAY LOAM

Sample DLV843 [GL25_21 BTJ] : SNDY CL LO = SANDY CLAY LOAM

Sample DLV844 [GL25_21 CCA] : SNDY CL LO = SANDY CLAY LOAM

Sample DLV848 [GL25_24 BCG] : SNDY CL LO = SANDY CLAY LOAM

Sample DLV851 [GL25_26 CG] : SNDY CL LO = SANDY CLAY LOAM

Sample DLV852 [GL25_34_TS BTGJ] : Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample DLV853 [GL25_25 BC] : SNDY CL LO = SANDY CLAY LOAM

SOIL SALINITY 4 (SOIL) Comments

Sample DLV852 [GL25_34_TS BTGJ] Soluble Ions: Detection limits raised due to sample matrix.

Results relate only to the items tested.

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Bureau Veritas Job #: C548352
Report Date: 2025/06/19

QUALITY ASSURANCE REPORT

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
B967702	Available (KCl) Total Nitrogen (N)	2025/06/02	124	75 - 125	101	75 - 125	<10	mg/kg	NC	30	110	80 - 120
B969596	Saturation %	2025/06/02							0.25	12	102	75 - 125
B969597	Soluble (CaCl2) pH	2025/06/02			100	97 - 103			0.63	N/A	100	97 - 103
B969757	Saturation %	2025/06/05							7.4	12	103	75 - 125
B969758	Soluble (CaCl2) pH	2025/06/03			100	97 - 103			0.37	N/A	99	97 - 103
B969949	Total Organic Carbon (C)	2025/06/03			101	80 - 120	<0.050	%	5.4	35	98	75 - 125
B971666	Soluble Conductivity	2025/06/03			101	90 - 110	<0.020	dS/m	9.9	20	100	75 - 125
B971669	Soluble Chloride (Cl)	2025/06/03	NC	75 - 125	98	80 - 120	<10	mg/L	12	30	100	75 - 125
B971768	% sand by hydrometer	2025/06/03							1.3	30	96	75 - 125
B971768	% silt by hydrometer	2025/06/03							3.0	30	105	75 - 125
B971768	Clay Content	2025/06/03							1.2	30	101	75 - 125
B971800	Soluble Calcium (Ca)	2025/06/03	96	75 - 125	97	80 - 120	<3.0	mg/L	16	30	100	75 - 125
B971800	Soluble Magnesium (Mg)	2025/06/03	95	75 - 125	95	80 - 120	<2.0	mg/L	17	30	93	75 - 125
B971800	Soluble Potassium (K)	2025/06/03	94	75 - 125	92	80 - 120	<2.0	mg/L	5.4	30	98	75 - 125
B971800	Soluble Sodium (Na)	2025/06/03	87	75 - 125	89	80 - 120	<3.0	mg/L	6.3	30	92	75 - 125
B971800	Soluble Sulphate (SO4)	2025/06/03					<6.0	mg/L	4.4	30	93	75 - 125
B973365	% sand by hydrometer	2025/06/04							2.4	30	99	75 - 125
B973365	% silt by hydrometer	2025/06/04							14	30	95	75 - 125
B973365	Clay Content	2025/06/04							0.52	30	105	75 - 125
B975691	Soluble Conductivity	2025/06/05			101	90 - 110	<0.020	dS/m	11	20	104	75 - 125
B975693	Soluble Chloride (Cl)	2025/06/05	98	75 - 125	98	80 - 120	<10	mg/L	10	30	98	N/A
B975702	Soluble Calcium (Ca)	2025/06/05	94	75 - 125	95	80 - 120	<3.0	mg/L	5.4	30	99	75 - 125
B975702	Soluble Magnesium (Mg)	2025/06/05	99	75 - 125	99	80 - 120	<2.0	mg/L	4.8	30	101	75 - 125
B975702	Soluble Potassium (K)	2025/06/05	94	75 - 125	94	80 - 120	<2.0	mg/L	NC	30	86	75 - 125
B975702	Soluble Sodium (Na)	2025/06/05	93	75 - 125	93	80 - 120	<3.0	mg/L	16	30	100	75 - 125
B975702	Soluble Sulphate (SO4)	2025/06/05					<6.0	mg/L	7.5	30	97	75 - 125
B976589	Soluble Conductivity	2025/06/06			101	90 - 110	<0.020	dS/m	17	20	102	75 - 125
B976619	Saturation %	2025/06/06									101	75 - 125
B977000	Soluble Conductivity	2025/06/06			98	90 - 110	<0.020	dS/m	4.3	20	100	75 - 125
B977237	Soluble Chloride (Cl)	2025/06/06	104	75 - 125	103	80 - 120	<10	mg/L			99	75 - 125
B977238	Soluble Calcium (Ca)	2025/06/06	95	75 - 125	96	80 - 120	<3.0	mg/L			92	75 - 125
B977238	Soluble Magnesium (Mg)	2025/06/06	101	75 - 125	103	80 - 120	<2.0	mg/L			96	75 - 125

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
B977238	Soluble Potassium (K)	2025/06/06	100	75 - 125	102	80 - 120	<2.0	mg/L			107	75 - 125
B977238	Soluble Sodium (Na)	2025/06/06	94	75 - 125	97	80 - 120	<3.0	mg/L			96	75 - 125
B977238	Soluble Sulphate (SO4)	2025/06/06					<6.0	mg/L			92	75 - 125
B978716	Moisture	2025/06/09					<0.30	%	2.5	20		
B982956	Calcium Carbonate Equivalent	2025/06/11			100	80 - 120	<0.60	%	2.8	35	102	75 - 125
B989336	Available (KCl) Nitrite (N)	2025/06/17	116	75 - 125	97	80 - 120	<10	mg/kg	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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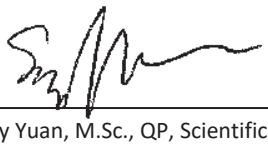
Bureau Veritas Job #: C548352
Report Date: 2025/06/19

STANTEC CONSULTING LTD
Client Project #: 123514064
Site Location: FORT SASKATCHEWAN
Sampler Initials: KM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics



Sandy Yuan, M.Sc., QP, Scientific Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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C548352
2025/05/27 12:26

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CHAIN OF CUSTODY RECORD

ENV COC - 00013v5

MED2-2025-05-823

Invoice Information	Invoice to (requires report) ☑	Report Information (if differs from invoice)		Project Information	
Company:	#4896 Stantec Consulting LTD.	Company:		Quotation #:	
Contact Name:	Accounts Payable	Contact Name:	Kathleen Meszaros	P.O. #/ AFE#:	
Street Address:	#200, 325-25th St. SE	Street Address:		Project #:	123514064
City: Calgary Prov: AB Postal Code: T2A 7H8		City: Prov: Postal Code:		Site #:	GreenLight Electricity Centre
Phone:	(403) 716-8000	Phone:	(250)814-9549	Site Location:	Fort Saskatchewan
Email:	SAPinvoices@Stantec.com	Email:	kathleen.meszaros@stantec.com	Site Location Province:	AB
Copies:	ashley.mathew@stantec.com	Copies:	ashley.fischer@stantec.com	Sampled By:	Kathleen Meszaros

Regulatory Criteria

☐ AT1 ☐ CCME ☐ Drinking Water - Canada ☐ Drinking Water - Manitoba ☐ Saskatchewan ☐ Drinking Water - Alberta ☐ Other _____

SAMPLES MUST BE KEPT COOL (<10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Regular Turnaround Time (TAT)
☐ 5 to 7 Day ☑ 10 Day

Rush Turnaround Time (TAT) Surcharges apply
☐ Same Day ☐ 1 Day ☐ 2 Day ☐ 3 Day ☐ 4 Day

Date Required: YY MM DD

Comments

	Sample Identification	Date Sampled YY	MM	DD	Time (24hr) HH	MM	Matrix	1 FIELD FILTERED	2 FIELD PRESERVED	3 LAB FILTRATION REQUIRED	4 BTEX F1	5 VOCs	6 BTEX F1-F2	7 BTEX F1-F4	8 Routine water	9 Regulated metals - total	10 Regulated metals - dissolved	11 Mercury - total	12 Mercury - dissolved	13 Soil Salinity 4	14 Sieve (75 micron)	15 Texture (% sand, silt, clay)	16 Calcium Carbonate Equivalent	17 TOC LECO Method	18 NRCS (Available) TKN	19 CEC	20	21 # OF CONTAINERS SUBMITTED	22 HOLD - DO NOT ANALYZE
1	GL25_09 Ap1	25	05	23	09	00	Soil													X		X		X	X	X			
2	GL25_09 Ap2	25	05	23	09	00	Soil													X		X		X	X	X			
3	GL25_09 Ae	25	05	23	09	00	Soil													X		X		X	X	X			
4	GL25_09 Bmgj	25	05	23	09	00	Soil													X		X	X			X			
5	GL25_09 IICgjkj	25	05	23	09	00	Soil													X		X	X						
6	GL25_18 Ap	25	05	24	09	00	Soil													X		X	X	X	X	X			
7	GL25_18 Bmk	25	05	24	09	00	Soil													X		X	X			X			
8	GL25_18 Ck	25	05	24	09	00	Soil													X		X	X						
9	GL25_21 Ap	25	05	23	09	00	Soil													X		X		X	X	X			
10	GL25_21 Btj	25	05	23	09	00	Soil													X		X	X	X		X			
11	GL25_21 Cca	25	05	23	09	00	Soil													X		X	X						
12	GL25_24 Ah	25	05	24	09	00	Soil													X		X		X	X	X			

*UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS AND CONDITIONS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS OR BY CALLING THE LABORATORY LISTED ABOVE TO OBTAIN A COPY

LAB USE ONLY	Yes	No	°C				Temperature reading by:
Seal present		✓		25	25	24	
Seal intact		✓		1	2	3	
Cooling media present		✓					

LAB USE ONLY	Yes	No	°C				
Seal present	✓			16 15	15	16	
Seal intact		✓		1	2	3	
Cooling media present							

LAB USE ONLY	Yes	No	°C				
Seal present	✓			16	15	15	
Seal intact		✓		1	2	3	
Cooling media present							

Relinquished by: (Signature/ Print)	Date YY	MM	DD	Time HH	MM	Received by: (Signature/ Print)	Date YY	MM	DD	Time HH	MM
1 Kathleen Meszaros	25	05	27	09	00	1 [illegible] KRISTOPHER MATH	2025	05	27	12	26
2 Scott Pastushak	25	05	27	09	00	2 ACCEPTED ANDRII SKORNYAKOV	2025	05	28	06	30

Special instructions

C548352
2025/05/27 12:26

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Winnipeg, MB: D-675 Berry St. R3H 1A7 Toll Free (866) 800-6208

CHAIN OF CUSTODY RECORD

ENV COC - 00013v5

CONTINUED

[PAGE 1 REFERENCE]

Company:	#4896 Stantec Consulting LTD.
Contact Name:	Accounts Payable
Project #:	123514064

SAMPLES MUST BE KEPT COOL (<10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

	Sample Identification	Date Sampled			Time (24hr)		Matrix	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Same as above
		YY	MM	DD	HH	MM		FIELD FILTERED	FIELD PRESERVED	LAB FILTRATION REQUIRED	BTEX F1	VOCs	BTEX F1-F2	BTEX F1-F4	Routine water	Regulated metals - total	Regulated metals - dissolved	Mercury - total	Mercury - dissolved	Salinity 4	Sieve (75 micron)	Texture (% sand, silt, clay)	Calcium Carbonate Equivalent	TOC LECO Method	NPKS (Available) TKN	CEC		# OF CONTAINERS SUBMITTED	HOLD - DO NOT ANALYZE	Comments
13	GL25_24 Ahe	25	05	24	09	00	Soil													X		X		X	X	X				
14	GL25_24 Btg	25	05	24	09	00	Soil													X		X	X			X				
15	GL25_24 BCg	25	05	24	09	00	Soil													X		X	X							
16	GL25_26 Ah	25	05	25	09	00	Soil													X		X		X	X	X				
17	GL25_26 Btg	25	05	25	09	00	Soil													X		X	X			X				
18	GL25_26 Cg	25	05	25	09	00	Soil													X		X	X							
19	GL25_34_TS Btgj	25	05	24	09	00	Soil													X		X	X							
20	GL25_25 BC	25	05	25	09	00	Soil													X		X	X							
21																														
22																														
23																														
24																														
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40																														

B.2 Soil Clubroot Laboratory Data

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Report Transmission Cover Page

Bill To: Stantec Consulting Ltd.
200, 325 - 25 St SE
Calgary, AB, Canada
T2A 7H8
Attn: Ashley Mathew
Sampled By: Kathleen Meszaros
Company: Stantec Consulting Ltd.

Project ID: 123514064
Project Name: Greenllight Electricity Centre
Project Location: Fort Saskatchewan
LSD: NE/SE 10-56-22-4
P.O.:
Proj. Acct. code:

Lot ID: **1816718**
Control Number:
Date Received: May 27, 2025
Date Reported: Jun 4, 2025
Report Number: 3141433
Report Type: Final Report

Contact	Company	Address
Ashley Mathew	**Stantec Consulting Ltd.**	200, 325 - 25 St SE Calgary, AB T2A 7H8 Phone: (403) 716-8000 Fax: Email: ashley.mathew@stantec.com

Delivery	Format	Deliverables
Email	Equis Stantec Batch File	Test Report
Email	Equis Stantec Result File	Test Report
Email	Equis Stantec Sample File	Test Report
Email	Equis Stantec Test File	Test Report
Email	PDF	COC / Test Report
Email	PDF	Invoice
Email	Standard Crosstab With Tabs	Test Report
Email - Merge	PDF	COA / COC

Contact	Company	Address
EDD	**Stantec Consulting Ltd.**	200, 325 - 25 St SE Calgary, AB T2A 7H8 Phone: (403) 781-5497 Fax: (403) 716-8039 Email: edd@stantec.com

Delivery	Format	Deliverables
Email	Equis Stantec Batch File	Test Report
Email	Equis Stantec Result File	Test Report
Email	Equis Stantec Sample File	Test Report
Email	Equis Stantec Test File	Test Report
Email	PDF	COC / Test Report
Email	Standard Crosstab With Tabs	Test Report

Contact	Company	Address
Kathleen Meszaros	**Stantec Consulting Ltd.**	200, 325 - 25 St SE Calgary, AB T2A 7H8 Phone: (403) 716-8000 Fax: Email: kathleen.meszaros@stantec.com

Delivery	Format	Deliverables
Email	Equis Stantec Batch File	Test Report
Email	Equis Stantec Result File	Test Report
Email	Equis Stantec Sample File	Test Report
Email	Equis Stantec Test File	Test Report
Email	PDF	COC / Test Report
Email	Standard Crosstab With Tabs	Test Report
Email - Merge	PDF	COA / COC

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Report Transmission Cover Page

Bill To: Stantec Consulting Ltd.
200, 325 - 25 St SE
Calgary, AB, Canada
T2A 7H8
Attn: Ashley Mathew
Sampled By: Kathleen Meszaros
Company: Stantec Consulting Ltd.

Project ID: 123514064
Project Name: Greenllight Electricity Centre
Project Location: Fort Saskatchewan
LSD: NE/SE 10-56-22-4
P.O.:
Proj. Acct. code:

Lot ID: **1816718**
Control Number:
Date Received: May 27, 2025
Date Reported: Jun 4, 2025
Report Number: 3141433
Report Type: Final Report

Contact	Company	Address
Mel Zwierink	**Stantec Consulting Ltd.**	200, 325 - 25 St SE Calgary, AB T2A 7H8 Phone: (403) 716-8000 Fax: Email: melvin.Zwierink@stantec.com

Delivery	Format	Deliverables
Email	Equis Stantec Batch File	Test Report
Email	Equis Stantec Result File	Test Report
Email	Equis Stantec Sample File	Test Report
Email	Equis Stantec Test File	Test Report
Email	PDF	COC / Test Report
Email	PDF	Invoice
Email	Standard Crosstab With Tabs	Test Report
Email - Merge	PDF	COA / COC

Notes To Clients:

- All wet soil samples received in a soil bag will be disposed 30 days after receipt on 2025-06-26.
- Sample 1816718-3; 9959909: Caution - Note for Clubroot analysis on identified samples: Although results are below the method detection limits (1000 spores/g), DNA amplification was measured, suggesting low concentrations of pathogen spores may be present. Caution should be taken.

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Analytical Report

Bill To: Stantec Consulting Ltd.
200, 325 - 25 St SE
Calgary, AB, Canada
T2A 7H8
Attn: Ashley Mathew
Sampled By: Kathleen Meszaros
Company: Stantec Consulting Ltd.

Project ID: 123514064
Project Name: Greenllight Electricity Centre
Project Location: Fort Saskatchewan
LSD: NE/SE 10-56-22-4
P.O.:
Proj. Acct. code:

Lot ID: **1816718**
Control Number:
Date Received: May 27, 2025
Date Reported: Jun 4, 2025
Report Number: 3141433
Report Type: Final Report

Reference Number	1816718-1	1816718-2	1816718-3
Sample Date	May 25, 2025	May 25, 2025	May 25, 2025
Sample Time	09:00	09:00	09:00
Sample Location			
Sample Description	CL25_CLBRT_comp_01 / 0-5 / cm	CL25_CLBRT_comp_02 / 0-5 / cm	CL25_CLBRT_comp_03 / 0-5 / cm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Clubroot Analysis						
Plasmodiophora brassicae	Clubroot Pathogen	spores/g	<1000	3780	<1000	1000
Plasmodiophora brassicae	Detected/ Not Detected	spores/g	Not Detected	Detected	Caution - See Note	1000

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Analytical Report

Bill To: Stantec Consulting Ltd.
200, 325 - 25 St SE
Calgary, AB, Canada
T2A 7H8
Attn: Ashley Mathew
Sampled By: Kathleen Meszaros
Company: Stantec Consulting Ltd.

Project ID: 123514064
Project Name: Greenllight Electricity Centre
Project Location: Fort Saskatchewan
LSD: NE/SE 10-56-22-4
P.O.:
Proj. Acct. code:

Lot ID: **1816718**
Control Number:
Date Received: May 27, 2025
Date Reported: Jun 4, 2025
Report Number: 3141433
Report Type: Final Report

Reference Number	1816718-4	1816718-5	1816718-6
Sample Date	May 25, 2025	May 25, 2025	May 25, 2025
Sample Time	09:00	09:00	09:00
Sample Location			
Sample Description	CL25_CLBRT_comp_04 / 0-5 / cm	CL25_CLBRT_comp_05 / 0-5 / cm	CL25_CLBRT_comp_06 / 0-5 / cm
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Clubroot Analysis						
Plasmodiophora brassicae	Clubroot Pathogen	spores/g	<1000	<1000	<1000	1000
Plasmodiophora brassicae	Detected/ Not Detected	spores/g	Not Detected	Not Detected	Not Detected	1000

Approved by:

Mike Yohemas, BSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

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Quality Control

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Attn: Ashley Mathew
Sampled By: Kathleen Meszaros
Company: Stantec Consulting Ltd.

Project ID: 123514064
Project Name: Greenllight Electricity Centre
Fort Saskatchewan
NE/SE 10-56-22-4
P.O.:
Proj. Acct. code:

Lot ID: **1816718**
Control Number:
Date Received: May 27, 2025
Date Reported: Jun 4, 2025
Report Number: 3141433
Report Type: Final Report

Sample Type	Sample ID	Analysis Date	Analyte	Units	Result	RDL	SPK Value	Ref Value	%REC	RPD	Limits	Passed
Clubroot Analysis												
Batch: 2587917 - Clubroot												
Blank	6836909	Jun 03, 2025	Plasmodiophora brassicae	spores/g	<1000						1000	yes
Blank	6836910	Jun 03, 2025	Plasmodiophora brassicae	spores/g	<1000						1000	yes
Replicate	6836913	Jun 03, 2025	Plasmodiophora brassicae	spores/g	<1000			<1000		0	100 % or 2000 Abs	yes

SPK Value = Spike Value
Ref Value = Reference Value
%REC = Percent Recovery
RPD = Relative Percent Difference
Abs = Absolute Difference

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Methodology and Notes

Bill To:	Stantec Consulting Ltd. 200, 325 - 25 St SE Calgary, AB, Canada T2A 7H8	Project ID:	123514064
Attn:	Ashley Mathew	Project Name:	Greenllight Electricity Centre
Sampled By:	Kathleen Meszaros	Project Location:	Fort Saskatchewan
Company:	Stantec Consulting Ltd.	LSD:	NE/SE 10-56-22-4
		P.O.:	
		Proj. Acct. code:	

Lot ID:	**1816718**
Control Number:	
Date Received:	May 27, 2025
Date Reported:	Jun 4, 2025
Report Number:	3141433
Report Type:	Final Report

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Clubroot	Plant Path	*	Wallenhammer et al 2012. In-Field distribution of Plasmodiophora brassicae measured using real-time PCR., Plant Pathology	Jun 03, 2025	Element Calgary

** Reference Method Modified*

References

Plant Path	Plant Pathology

Comments:

- Sample 1816718-3; 9959909: Caution - Note for Clubroot analysis on identified samples: Although results are below the method detection limits (1000 spores/g), DNA amplification was measured, suggesting low concentrations of pathogen spores may be present. Caution should be taken.

Appendix C Representative Profiles

Table C.1 Angus Ridge (AGS) Soil Series

Representative Site: GL25_18*					
Horizon	**Depth (cm)**	**Colour**	**Lab Texture**	**Structure**	**Consistence**
Ap	0-42	10YR 2/2	Loam	Weak/Fine/Granular	Very Friable
Btjk	42-70	10YR 4/4	Clay loam	Weak/Medium/ Subangular blocky	Friable
Ck	70-105	10YR 5/4	Sandy loam	-/-/-	Friable
Horizon	**pH**	**EC**	**SAR**	**CCE**	**OC Content**
Ap	5.1	0.9	1.2	0.7	3.0
Btjk	7.5	0.5	1.7	1.1	-
Ck	7.6	0.8	7.5	3.6	-

Notes:

- = Not available

EC = electrical conductivity

CCE = calcium carbonate equivalent

OC = organic carbon

Table C.2 Hobbema Coarse Thick (HBMcotk) Topsoil Soil Series

Representative Site: GL25_09					
Horizon	**Depth (cm)**	**Colour**	**Lab Texture**	**Structure**	**Consistence**
Ap1	0-37	10YR 2/2	Sandy loam	Weak/Fine/Granular	Friable
Ap2	37-60	10YR 3/2	Loam	Weak/Medium/ Subangular blocky	Friable
Ae	60-70	10YR 5/2	Loam	Weak/Medium/Platy	Friable
Bmgj	70-95	10YR 6/3	Sandy loam	Weak/Medium/ Subangular blocky	Friable
Cgjkj	95-120	10YR 3/6	Sandy clay loam	//	Firm
Horizon	**pH**	**EC**	**SAR**	**CCE**	**OM Content**
Ap1	4.9	0.5	0.8	-	3.7
Ap2	5.6	0.4	0.6	-	3.2
Ae	6.0	0.6	0.8	-	0.2
Bmgj	5.6	0.4	1.4	0.6	-
Cgjkj	5.9	0.4	2.1	0.6	-

Notes:

- = Not available

EC = electrical conductivity

CCE = calcium carbonate equivalent

OC = organic carbon

Table C.3 Haight (HGT) Soil Series

Representative Site: GL25_26					
Horizon	**Depth (cm)**	**Colour**	**Lab Texture**	**Structure**	**Consistence**
LFH	3-0	-	-	-/-/-	-
Ah	0-20	10YR 2/2	Silt loam	Weak/Fine/Granular	Friable
Btg	20-22	2.5Y 4/2	Clay loam	Weak/Fine/Platy	Friable
Btgj	22-50	2.5Y 4/3	Clay loam	Moderate/Fine/ Subangular blocky	Firm
C	50-90	2.5Y 4/4	Sandy clay loam	-/-/-	Firm
Horizon	**pH**	**EC**	**SAR**	**CCE**	**OC Content**
LFH	-	-	-	-	-
Ah	5.2	0.3	1.9	-	3.1
Btg	6.9	0.8	3.8	0.6	-
Btgj	-	-	-	-	-
C	-	-	-	0.7	-

Notes:

- = Not available

EC = electrical conductivity

CCE = calcium carbonate equivalent

OC = organic carbon

Appendix D Selected Field Photos

Photo 1	*Soil pit photo at GL25_18 (Angus Ridge)*	*Photo 2*	*Site photo facing north at GL25_18 (Angus Ridge)*
			

Photo 3	*Soil pit photo at GL25_09 (Hobbema-coarse-thick topsoil)*	*Photo 4*	*Site photo facing north at GL25_09 (Hobbema-coarse-thick topsoil)*
			

Photo 5	*Soil pit photo at GL25_03 (Haight-coarse)*	*Photo 6*	*Site photo facing north at GL25_03 (Haight-coarse)*
			

Photo 7	*Soil pit photo at GL25_33_TS (Pibroch)*	*Photo 8*	*Site photo facing north at GL25_33_TS (Pibroch)*
			

Photo 9	*Soil pit photo at GL25_08 (Ponoka)*	*Photo 10*	*Site photo facing north at GL25_08 (Ponoka)*
			

Appendix C Wildlife Species at Risk and Species of Conservation Concern Potentially Occurring in the RAA

Table C.1 Wildlife Species at Risk and Species of Management Concern Potentially Occurring in the RAA

Common Name	Scientific Name	COSEWIC[1]	SARA[1]	Alberta *Wildlife Act* and AESCC[2]	Alberta General Status Listing[3]	Habitat Association	Observed in LAA[4]
Birds							
Trumpeter swan	*Cygnus buccinator*	Not at risk	No status	Special concern	Sensitive	Wetland	--
White-winged scoter	*Melanitta fusca*	--	--	Special concern	Sensitive	Wetland	--
Sharp-tailed grouse	*Tympanuchus phasianellus*	--	--	--	Sensitive	Grassland	--
Pied-billed grebe	*Podilymbus podiceps*	--	--	--	Sensitive	Wetland	--
Horned grebe	*Podiceps auritus*	Special concern	Special concern	--	Sensitive	Wetland	--
Western grebe	*Aechmophorus occidentalis*	Special concern	Special concern	Threatened	At risk	Wetland	--
American white pelican	*Pelecanus erythrorhynchos*	--	--	--	Sensitive	Wetland	--
American bittern	*Botaurus lentiginosus*	--	--	--	Sensitive	Wetland	--
Great blue heron	*Ardea herodias*	--	--	--	Sensitive	Wetland	--
Black-crowned night-heron	*Nycticorax nycticorax*	--	--	--	Sensitive	Wetland	--
Bald eagle	*Haliaeetus leucocephalus*	--	--	--	Sensitive	Wetland	--
Northern goshawk	*Accipiter gentilis*	--	--	--	Sensitive	Woodland	--
Broad-winged hawk	*Buteo platypterus*	--	--	--	Sensitive	Woodland	--
Golden eagle	*Aquila chrysaetos*	--	--	--	Sensitive	Cliff/rocky outcropping	--
White-faced ibis	*Plegadis chihi*	--	--	--	Sensitive	Wetland	--

Common Name	Scientific Name	COSEWIC[1]	SARA[1]	Alberta *Wildlife Act* and AESCC[2]	Alberta General Status Listing[3]	Habitat Association	Observed in LAA[4]
Yellow rail	*Coturnicops noveboracensis*	Special concern	Special concern	--	Undetermined	Wetland	--
Sora	*Porzana carolina*	--	--	--	Sensitive	Wetland	Yes
Sandhill crane	*Grus canadensis*	--	--	--	Sensitive	Wetland	--
Black-necked stilt	*Himantopus nexicanus*	--	--	--	Sensitive	Wetland	--
Upland sandpiper	*Bartramia longicauda*	--	--	--	Sensitive	Grassland	--
Long-billed curlew	*Numenius americanus*	Special concern	Special concern	Special concern	Sensitive	Grassland	--
Buff-breasted sandpiper	*Tryngites subruficollis*	Special concern	Special concern	--	Secure	Wetland	--
Red-necked phalarope	*Phalaropus lobatus*	Special concern	--	--	Secure	Wetland	--
Caspian tern	*Hydroprogne caspia*	--	--	--	Sensitive	Wetland	--
Black tern	*Chlidonias niger*	--	--	--	Sensitive	Wetland	--
Barred owl	*Strix varia*	--	--	Special concern	Sensitive	Woodland	--
Great gray owl	*Strix nebulosa*	--	--	--	Sensitive	Woodland	Yes
Short-eared owl	*Asio flammeus*	Threatened	Special concern	--	May be at risk	Woodland	--
Common nighthawk	*Chordeiles minor*	Special concern	Special concern	--	Sensitive	Grassland	--
Black-backed woodpecker	*Picoides arcticus*	--	--	--	Sensitive	Woodland	--
Pileated woodpecker	*Dryocopus pileatus*	--	--	--	Sensitive	Woodland	--
American kestrel	*Falco sparverius*	--	--	--	Sensitive	Grassland	Yes

Common Name	Scientific Name	COSEWIC[1]	SARA[1]	Alberta *Wildlife Act* and AESCC[2]	Alberta General Status Listing[3]	Habitat Association	Observed in LAA[4]
Peregrine falcon, *anatum*/*tundrius* ssp.	*Falco peregrinus anatum/tundrius*	Not at Risk	Special concern	Threatened	At risk	Cliff/rocky outcropping	--
Olive-sided flycatcher	*Contopus cooperi*	Special concern	Special concern	--	May be at risk	Woodland	--
Western wood-pewee	*Contopus sordidulus*	--	--	--	May be at risk	Woodland	
Eastern phoebe	*Sayornis phoebe*	--	--	--	Sensitive	Woodland	
Eastern kingbird	*Tyrannus tyrannus*	--	--	--	Sensitive	Grassland	
Loggerhead shrike	*Lanius ludovicianus*	Threatened	Threatened	Special concern	Sensitive	Shrubland	--
Purple martin	*Progne subis*	--	--	--	Sensitive	Wetland	--
Bank swallow	*Riparia riparia*	Threatened	Threatened	--	Sensitive	Wetland	--
Barn swallow	*Hirundo rustica*	Special concern	Threatened	--	Sensitive	Grassland	
Brown creeper	*Certhia americana*	--	--	--	Sensitive	Woodland	--
Sedge wren	*Cistothorus platensis*	--	--	--	Sensitive	Wetland	--
Sprague's pipit	*Anthus spragueii*	Threatened	Threatened	Special concern	Sensitive	Grassland	--
Common yellowthroat	*Geothlypis trichas*	--	--	--	Sensitive	Wetland	=
Cape May warbler	*Setophaga tigrina*	--	--	In process	Sensitive	Woodland	--
Bay-breasted warbler	*Setophaga castanea*	--	--	In process	Sensitive	Woodland	--
Black-throated green warbler	*Setophaga virens*	--	--	Special concern	Sensitive	Woodland	--
Canada warbler	*Cardellina canadensis*	Threatened	Threatened		At risk	Woodland	--
Baird's sparrow	*Ammodramus bairdii*	Special concern	Special concern	--	Sensitive	Grassland	--
Western tanager	*Piranga ludoviciana*	--	--	--	Sensitive	Woodland	--

Common Name	Scientific Name	COSEWIC[1]	SARA[1]	Alberta *Wildlife Act* and AESCC[2]	Alberta General Status Listing[3]	Habitat Association	Observed in LAA[4]
Bobolink	*Dolichonyx oryzivorus*	Special concern	Threatened	--	Sensitive	Grassland, wetland	--
Rusty blackbird	*Euphagus carolinus*	Special concern	Special concern	--	Sensitive	Wetland	--
Baltimore oriole	*Icterus galbula*	--	--	--	Sensitive	Woodland	
Herptiles							
Canadian toad	*Anaxyrus hemiophrys*	--	--	Data deficient	May be at risk	Wetland	--
Western (boreal) toad	*Anaxyrus boreas*	Special concern	Special concern	--	Sensitive	Wetland	--
Western tiger salamander, *melanostictum* ssp., Prairie / Boreal pop.	*Ambystoma mavortium melanostictum*	Special concern	--	--	Secure	Wetland	--
Plains gartersnake	*Thamnophis radix*	--	--	--	Sensitive	Grassland	--
Red-sided (common) gartersnake, *parietalis* ssp.	*Thamnophis sirtalis parietalis*	--	--	--	Sensitive	Grassland	--
Mammals							
Silver-haired bat	*Lasionycteris noctivagans*	--	--	--	Sensitive	Woodland	--
Eastern red bat	*Lasiurus borealis*	--	--	--	Sensitive	Woodland	--
Hoary bat	*Lasiurus cinereus*	--	--	--	Sensitive	Woodland	--
Little brown myotis	*Myotis lucifugus*	Endangered	Endangered	--	May be at risk	Woodland	--
Northern (long-eared) myotis	*Myotis septentrionalis*	Endangered	Endangered	Data deficient	May be at risk	Woodland	--

Common Name	Scientific Name	COSEWIC[1]	SARA[1]	Alberta *Wildlife Act* and AESCC[2]	Alberta General Status Listing[3]	Habitat Association	Observed in LAA[4]
Long-tailed weasel, *longicauda* ssp., prairie pop.	*Mustela frenata longicauda*	--	--	--	May be at risk	Grassland	
American badger, *taxus* ssp.	*Taxidea taxus taxus*	Special concern	Special concern	Data deficient	Sensitive	Grassland	Yes
Arthropods							
Monarch	*Danaus plexippus*	Endangered	Endangered	--	--	Grassland	--
Gypsy cuckoo bumble bee	*Bombus bohemicus*	Endangered	Endangered	--	--	Grassland	--

Notes:

-- = no status or not at risk

[1] GOC 2025

[2] GOA 2024

[3] GOA 2022

[4] Stantec field surveys (Stantec 2025), Stantec unpublished data, or FWMIS records (GOA 2025)

Appendix E Environmental Protection Plan

Greenlight Electricity Centre Project Environmental Protection Plan

August 2025

Table of Contents

List of Tables

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Acronyms / Abbreviations

%	percent
>	greater than
ACSW	Alberta Culture and Status of Women
AEP	Alberta Environment and Parks
AEPA	Alberta Environment and Protected Areas
AESCC	Alberta Endangered Species Conservation Committee
AUC	Alberta Utilities Commission
BMP	best management practice
EPEA	*Environmental Protection and Enhancement Act*
EPP	environmental protection plan
ESC	erosion and sediment control
GECGP	Greenlight Electricity Centre GP Ltd.
ha	hectare
HRA	*Historical Resources Act*
IH-DIZ	Alberta Industrial Heartland – Designated Industrial
Kineticor	Zone Kineticor Resource Corp.
km	kilometre
L	litre
m	metre
MBCA	*Migratory Birds Convention Act*
mg/kg	milligrams per kilogram
mm	millimetre
MW	megawatt
NSR	Natural Subregion
PDA	Project Development Area
PNP	Primary Nesting Period
QP	Qualified Professional
RAP	restricted activity period
RoW	right-of-way

SARA	*Species at Risk Act*
SDS	safety data sheet
the Project	Greenlight Electricity Centre
WHMIS	Workplace Hazardous Materials Information System

1 Project Overview

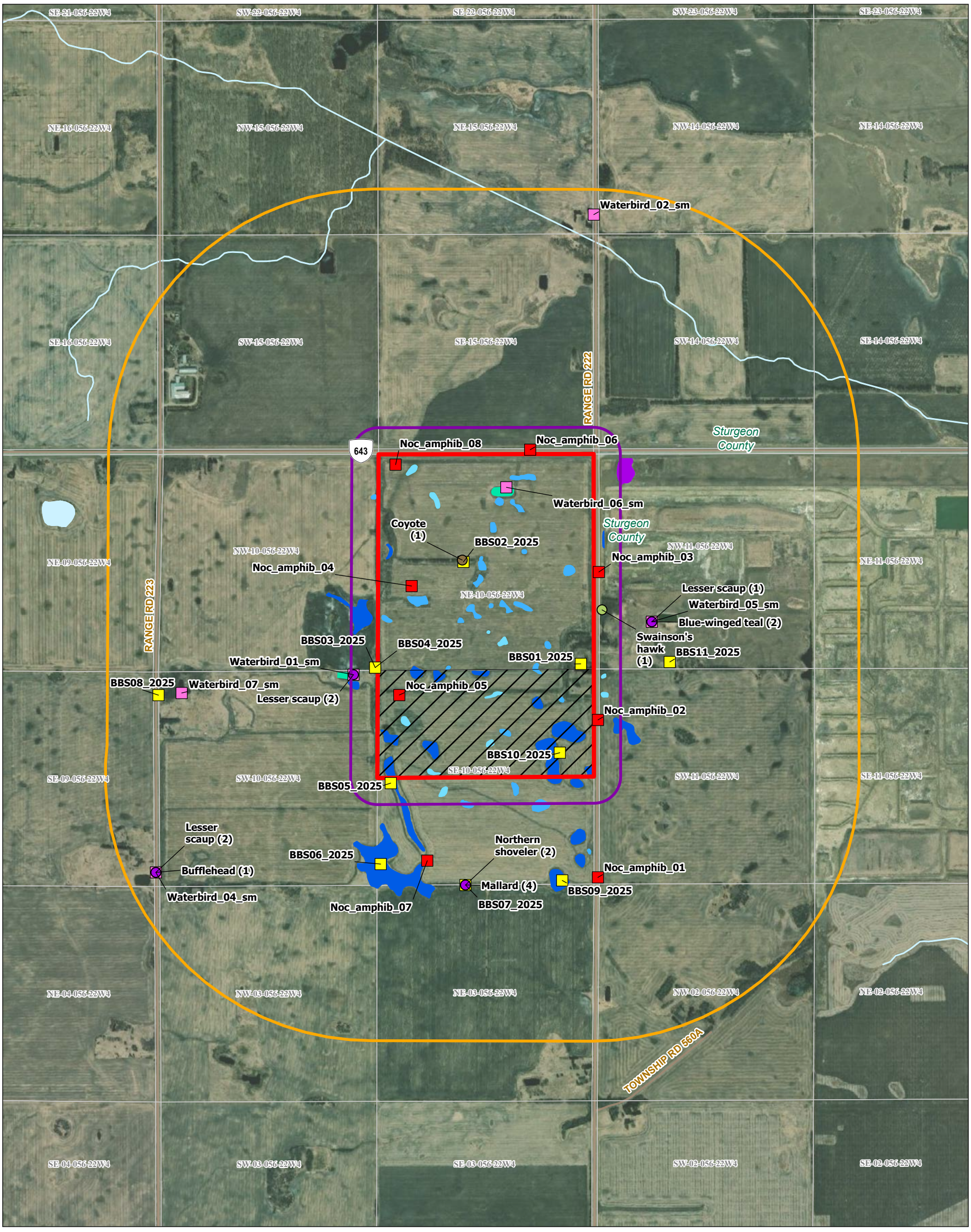
Greenlight Electricity Centre GP Ltd. (GECGP), on behalf of Greenlight Electricity Centre LP. is constructing and will operate the Greenlight Electricity Centre (the Project), a combined cycle power generation facility. The Project will have a total plant output of 1864 megawatt (MW) from four 466 MW gas/steam turbine line ups. The Project will be located on approximately 98 hectares (ha) in the northeast and southeast quarter sections of Section 10 Township 56 Range 22 W4M, approximately 10 kilometres (km) east of Gibbons, Alberta in Sturgeon County. The Project is located in the following legal subdivisions:

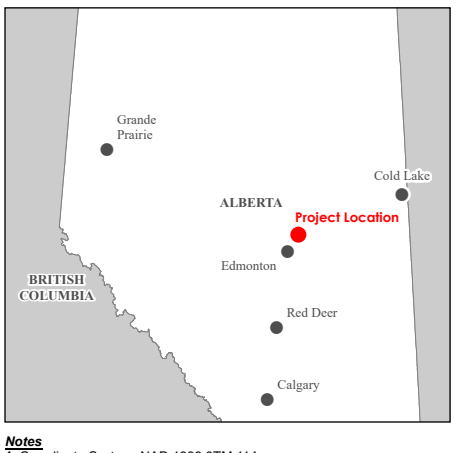
- 15-10-056-22-W4M
- 16-10-056-22-W4M
- 10-10-056-22-W4M
- 09-10-056-22-W4M
- 07-10-056-22-W4M
- 08-10-056-22-W4M

Legal subdivisions 07-10-056-22-W4M and 08-10-056-22-W4M will be used for long term storage and workspace (Laydown Area) during construction. Together, this area makes up the Project development area (PDA).

The Project will feature four 1x1 gas/steam turbine line ups utilizing class H combined cycle gas turbines supplied with pipeline spec natural gas fed by a constructed pipeline tied to an existing natural gas distribution network. Additionally, the Project will include fuel gas treatment components, generator step-up transformers, associated power distribution modules, and a demineralized water treatment facility with associated storage tanks (see Figure 1 for locations of Project components). The electricity produced will be added to the Alberta Provincial Grid to help meet the power requirements of the province and to supply data centres.

The Project is being developed in two phases, each with two 466 MW gas/steam turbine line ups. Construction of the Project is anticipated to start in Q3 2026, with commissioning anticipated in 2029. The Project is expected to be in operation for 30 years. The Laydown Area will be cleared, graded and graveled for storage and workspace during operation of the Project (e.g., during phase 2 of development). No reclamation activities are anticipated to occur in the Laydown Area during operation of the Project.





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

- Project Development Area
- Laydown Area
- Vegetation Local Assessment Area (100 m)
- Wildlife Local Assessment Area (1 km)

Wildlife Observation
- Den
- Individual
- Sticknest

Wildlife Station
- Amphibian visual encounter survey
- Breeding bird survey
- Nocturnal amphibian survey
- Waterbird survey

Wetland
- Dugout
- Ephemeral Waterbody
- Seasonal Graminoid Marsh
- Semi-Permanent Graminoid Marsh
- Temporary Graminoid Marsh

- Road
- Watercourse
- Quarter Section
- Waterbody

*Entire Map Extent is in Bird Nesting Zone B4

0 100 200 300
Metres

(At original document size of 11x17) 1:15,000

N

Stantec

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

Prepared by AY on 2025-08-19

Client/Project
Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP.
Greenlight Electricity Centre Project
Environmental Protection Plan

123514064-0017

Figure No.
1

Title
Project Overview

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1.1 Scope and Purpose of the Document

The purpose of this environmental protection plan (EPP) is to describe the environmental mitigation measures and commitments to be carried out by GECGP, its Contractor(s), and subcontractor(s) during construction and operation of the Project. Cleanup and reclamation are discussed in Section 3.

The EPP:

- Outlines environmental protection measures related to Project activities to facilitate environmental protection during construction
- Provides instructions for carrying out construction activities to reduce environmental effects
- Provides reference information to support decision making during construction

The technical scope of this document is restricted to the activities required for construction of the Project. There may be a need to revise specific measures as a result of ongoing consultation, pre-construction surveys, or to address unforeseen site specific conditions that may arise during detailed design and execution. If this occurs, GECGP will resolve the issue with Contractor(s) in consultation with the appropriate regulators. The resolution and/or revision will be documented in a revision to the EPP or elsewhere as necessary and communicated to the appropriate parties.

1.2 Roles and Responsibilities

GECGP, Contractor(s), Environmental Inspector and applicable Qualified Professionals (QPs) and designates are responsible for environmental compliance during construction, operation and reclamation of the Project.

GECGP and Contractor(s) are responsible for obtaining all necessary approvals, licenses, permits and fulfilling regulatory requirements related to applicable activities of the Project.

Table 1 describes the roles and responsibilities of key Project personnel.

Table 1 Roles and Responsibilities

Personnel	Roles and Responsibilities
GECGP	• Consult with landowners and other parties on a regular basis during construction of the Project on environmental matters.
Contractor(s)	• Responsible for environmental compliance during construction of the Project, including adherence to the mitigation presented in this EPP and regulatory approvals obtained for the project. • Maintain understanding of all Project related commitments and conditions • Implement appropriate training to Project personnel including sub-constructors. • Implement work in accordance with the requirement included herein in addition to the Contractor's own internal requirements (whichever is more stringent).

Personnel	Roles and Responsibilities
Qualified Professional(s)	• QPs will provide advice and support in relation to specific environmental concerns (e.g., wildlife species concerns, important habitat features, watercourse crossings, contaminated sites etc.) on a particular element or aspect of the EPP and associated management and contingency plans. Note that a person acting under the supervision of a QP is deemed to be a QP for the purposes of implementing aspects/mitigation of this EPP.
Environmental inspector	• The Environmental Inspector (EI) or designate will monitor and verify compliance with local, provincial, and federal environmental regulations, approval conditions, and the EPP. The EI or designate will monitor and verify that all environmental commitments, undertakings and approval conditions are met and that work is completed in compliance with applicable environmental legislation and company policies, standards, procedures and specifications in the most efficient and effective way possible.

1.3 Regulatory Context

The construction Contractor(s) will comply with all permits, approvals, authorizations, and notifications, and will be compliant with current legislation. Table 2 presents other federal and provincial legislation applicable to this Project.

Table 2 Applicable Legislation and Policy Guidance

Legislation or Policy Guidance	Requirements or Guidance Provided
Federal	
Species at Risk Act (SARA)	Protect species listed as extirpated, endangered, and threatened on federally regulated land or designated critical habitat. Applicable prohibitions include: • Section 32 prohibits killing, harming, or taking species at risk • Section 33 prohibits damage or destruction of residences of species at risk • Species protected include wildlife and plant species The Project is not located in any critical habitat for SARA listed species and is not anticipated to interact with SARA listed species. See Section 2.4 of this EPP for direction on wildlife encounters.
Migratory Birds Convention Act (MBCA) and Migratory Bird Regulations	Protects and conserves migratory bird populations and individuals and their nests in Canada. Section 6 of the Migratory Birds Regulations prohibits the disturbance, destruction, or taking of a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or possession of a migratory bird, carcass, skin, nest, or egg of a migratory bird without authorization. As there are no authorizations to allow construction-related effects on migratory birds and their nests, best management practices will be followed to comply with the MBCA. See Section 2.4 of this EPP for direction on wildlife encounters.

Legislation or Policy Guidance	Requirements or Guidance Provided
Provincial	
Alberta Utilities Commission (AUC) Rule 007: Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Developments and Gas Utility Pipelines	The AUC Rule 007 applies to applications for the construction or alteration and operations of power plants, substations, transmission lines, industrial system designations and hydro developments and gas utility pipelines approval are required for any proponent intending to construct, connect, operate, or alter any of the above.
Environmental Protection and Enhancement Act (EPEA)	An application to AEPA under the Guide to Content for Industrial Approval Applications (AEPA 2014), Part 1: New Plants and Facilities was submitted in August 2025. GECGP anticipates a decision from AEPA in the next 6-8 months. Given that the Project is located within the IH-DIZ, the Industrial heartland designated industrial zone directive: standard conditions (GOA 2022) will apply.
Municipal Government Act	Land use planning on private lands is primarily governed by the *Municipal Government Act*. Private landowners make decisions regarding how they use and manage their lands consistent with provincial legislation and municipal bylaws. Should public roads be used during construction, approvals may be required from the municipality.
Soil Conservation Act	In Alberta, the *Soil Conservation Act* requires landowners or occupants to prevent soil loss or deterioration from taking place, and to stop any identified loss or deterioration from continuing.
Water Act	Development within all wetlands and watercourses is regulated in Alberta under the provincial *Water Act*. Specific guidance for permitting of development affecting wetlands is provided in the Government of Alberta Wetland Policy implementation directives and tools.
Water Act; Wetland Policy	The goal of the Wetland Policy is an ordered hierarchy of avoidance of effects on wetlands, followed by mitigation of unavoidable effects and lastly, restoration (possibly with associated compensation) for unmitigated wetland effects. A *Water Act* Approval will be necessary for the Project.
Historical Resources Act HRA 4940-25-0046-001	Approval under the Historic Resources Act has been obtained. No requirements or conditions were included as a part of the Approval; however, GECGP and the Contractor(s) must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources (see Section 2.6, below).
Weed Control Act	In Alberta, the *Weed Control Act* requires landowners or occupants to: • Destroy plants listed as prohibited noxious upon discovery • Control populations of plants listed as noxious to prevent their spread

Legislation or Policy Guidance	Requirements or Guidance Provided
Wildlife Act	In Alberta, wildlife and some plant species are regulated under the Alberta *Wildlife Act* and the Alberta Wildlife Regulation. The *Act* (section 36[1]) states that "a person shall not willfully molest, disturb or destroy a house, nest or den of a prescribed wildlife or a beaver dam in prescribed areas at prescribed times". In addition, the *Act* protects species listed as endangered or threatened, and the Alberta Wildlife Regulation provides a list of species considered endangered or threatened. Before species are listed by the Government of Alberta, the Alberta Endangered Species Conservation Committee (AESCC) provides designation recommendations for Alberta species as endangered, threatened, special concern, data deficient, or under recommendation for a status change.

1.4 Environmental Sensitivities

Land cover within the PDA consists mostly of disturbed cultivated land. Undisturbed portions consist of upland coniferous communities with some deciduous trees and shrubs present. The Project is located within the Dry Mixedwood Natural Subregion (NSR) of the Boreal Natural Region of Alberta (Natural Regions Committee 2006) on agricultural land with some remnant patches of deciduous forest land with aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) and numerous small wetlands. The Dry Mixedwood NSR lies between the Central Parkland and Central Mixedwood NSRs. The Dry Mixedwood NSR has warmer summers and milder winters than other subregions in the Boreal Natural Region. The majority of annual precipitation falls during the growing season, with peak precipitation in June and July (Natural Regions Committee 2006). Terrain is gently undulating glacial till or lacustrine plains. Some hummocky uplands also occur. Aspen forests are prevalent on upland landscapes with mixed understories of rose (*Rosa* sp.), low-bush cranberry (*Viburnum edule*), beaked hazelnut (*Corylus cornuta*) and Canada buffaloberry (*Shepherdia canadensis*). Wetlands occupy approximately 15% of the subregion, and include 10% organic wetlands, and 5% shallow peat or mineral wetlands (Natural Regions Committee 2006). Land-use in the region includes forestry, oil and gas activity, grazing and cultivation (Natural Regions Committee 2006). Soils in the subregion include gray and dark gray luvisols on uplands, and gleysols and organic soils in wetlands (Natural Regions Committee 2006).

1.4.1 Wetlands

There are 42 wetlands and ephemeral waterbodies partially or completely within the PDA (5.79 ha) including 18 ephemeral waterbodies, 12 temporary graminoid marshes, and 12 seasonal graminoid marshes. No semi-permanent or permanently flooded wetlands are present on the PDA.

A *Water Act* Application supported by a Wetland Assessment Impact Report is currently being prepared. *Water Act* approval will be obtained prior to the commencement of construction.

See Section 2.4 for wetland specific mitigations.

1.4.2 Soil

Potential effects of the Project on soils include a change in soil quality or quantity resulting from soil stripping, soil loss during storage or transport, grading, or heavy equipment/vehicle traffic during the construction phase of the Project. Soils in the PDA are susceptible to compaction, rutting, erosion, and admixing. See Section 2.6 for soil management, erosion and sediment control mitigation measures.

Clubroot has been detected within the PDA. GECGP, the EI and Contractor(s) will implement a GECGP Clubroot Management Plan.

1.4.3 Wildlife

Project construction, including vegetation removal, and ground disturbance have the potential to affect wildlife species and habitat through direct habitat loss as well as temporary sensory disturbance and increased risk of mortality particularly through vehicle collisions. Project operation and maintenance activities also have the potential to increase mortality risk for wildlife.

See Section 2.5 for wildlife specific mitigation.

1.4.4 Weed Management

The introduction and spread of weeds may affect diversity and regeneration (during reclamation) of agricultural lands. Weeds may be introduced through construction activities such as ground disturbance and vehicle and equipment movement.

Six noxious species (common burdock [*Arctium minus*], creeping thistle [*Cirsium arvense*], field bindweed [*Convolvulus arvensis*], perennial sow-thistle [*Sonchus arvensis*], white cockle [*Silene latifolia*], and scentless chamomile [*Tripleurospermum inodorum*]) were identified during field surveys in the PDA.

See Section 2.3.2 for weed and pest management mitigation.

2 Environmental Mitigation Plans and Best Management Practices

The following sections detail environmental mitigation and best management practices that will be followed during construction of the Project.

2.1 Hazardous Materials and Waste Management

Hazardous materials and waste management during construction includes general handling of hazardous (e.g., fuel, lubricants, oil, hydraulic fluid, paint, etc.) and non-hazardous materials (e.g., concrete waste, plastics, excess construction material, etc.), waste management, and recycling. Mitigation and best management practices for hazardous materials and waste management are described below.

2.1.1 Waste Management

Proper waste management includes, but not limited to the following:

1. Waste is to be collected and stored in designated areas only
2. Waste stream quantities (from waste tickets) will be recorded for the duration of the Project, and a waste tracking sheet will be utilized to track waste tickets. Copies of these document will be provided to GECGP upon request
3. Hazardous and non-hazardous waste materials will be reused or recycled, when possible
4. Containers will be placed in an appropriate area of the PDA (level ground, easy access) and the type of wastes (i.e., recyclable—paper/cardboard, wood waste, garbage etc.) will be clearly identified and be collected in animal proof containers and disposed at an approved facility
5. There will be adequate portable toilets available for workers

Good housekeeping activities are the responsibility of all personnel working on the Project. These activities intend to reduce the amount of waste materials and maximize the amount of recyclable material that can be efficiently gathered at the local collection points. The Contractor(s) will assign housekeeping responsibility to their foreman who will monitor and manage the field operations with regards to housekeeping and waste management. Any issues identified by the foreman will be discussed with GECGP during scheduled construction meetings.

2.1.2 Hazardous Materials

6. All hazardous material stored and handled on-site will follow WHMIS requirements.

7. Transport, handle, use and dispose of hazardous materials in accordance with provincial and federal regulatory requirements.

8. Leaks/spills will immediately be contained, cleaned up, and reported upon detection (see Section 2.2)

2.2 Environmental Incident Prevention and Response

An environmental incident is an event where the consequences have led, may lead to, or is causing an adverse environmental effect (e.g., near miss spill, sediment release, etc.). The following sections describe mitigation and procedures to be implemented that are designed to reduce the likelihood of an environmental incident and the actions that will be taken if an incident occurs. An emergency contact list will be completed by the Contractor(s) and will be made available for use on-site. In addition, the Contractor(s) is required to have an internal Project specific emergency response plan, which will be available on-site.

The Project specific Emergence Response Plan will be available prior to construction.

2.2.1 Emergency Response Procedures

2.2.1.1 Pre-planning

Emergency response pre-planning procedures will include:

9. Completion of utility locates and identification of all infrastructure within the PDA (oil and gas, utilities, communication, and power lines, fiberoptic cables, etc.)

10. Compilation of emergency contact information and emergency call cards to be accessible to all individuals on site

11. Compilation of safety data sheet information for materials expected to be needed to complete the work

12. Having sufficient spill kits, fire extinguishers, safety manuals, and first aid kits available in the on-site trailer(s), and in vehicles

13. Completion of emergency response training for all workers on-site

2.2.1.2 Construction Practices

Construction practices relating to incident response will include:

14. Posting of emergency contact information and incident response procedures in the laydown area and in supervisor vehicles
15. Having a designated muster point
16. Safety data sheets kept with the materials and/or the on site construction office
17. Equipment and vehicles will have spill kits, fire extinguishers, and first aid kits in them, which will be regularly maintained
18. Exhaust and engine systems will be in good working condition, and undercarriages will be inspected periodically to confirm that flammable materials do not accumulate
19. To reduce the risk of fire hazards, vehicles shall not be left idling for more than five minutes at a time and will not be parked on tall grass
20. Vehicles and equipment will be inspected, maintained, and operated correctly and safely
21. Implementation of incident response procedures immediately following an incident
22. Proper handling of materials and wastes

2.2.1.3 Incident Response

2.2.1.3.1 Substance Release

23. Stop work, shut down equipment, and if safe to do so close valves, plug hoses, etc.
24. Remove sources of ignition (i.e., no smoking), have a fire extinguisher readily available
25. Secure source of release if safe to do so
26. Contain the release using spill kits, berms, dikes, or other available means
27. Take measures to limit potential for a release to enter surface water bodies or other environmentally sensitive areas

28. Immediately notify the Contractor(s) and GECGP if the incident is significant or assistance is required, the Contractor(s) will contact Fire Emergency (911) and if release is reportable notify Alberta Environment and Protected Areas (AEPA) (1-800-222-6514). A spill is considered significant if the substance cannot be contained, is entering a water body, is a regulated dangerous good, might cause an adverse effect on the environment or people, or cannot be identified

    - Events reportable to AEPA include any spill, release, or emergency that may cause, is causing, or has caused an adverse effect to the environment

29. Traffic will be limited to essential equipment and vehicles in and around an incident site. Construction activity at the spill site will remain suspended until permission to resume activity has been given by GECGP or designate in consultation with AEPA

30. Contaminated areas are to be remediated to most recent Alberta Tier I Guidelines for Soil and Groundwater Guidelines (GOA 2024). Clean up and remediate the spill site in consultation with the Contractor(s), EI and GECGP. Contaminated materials are to be disposed at an approved facility and in accordance with regulatory requirements

31. Replenish spill kits

32. To provide adequate response capability in the event of a fluid spill (e.g., fuel, hydraulic fluid, oil, etc.), spill kits and spill containment materials will be always available on-site and be located strategically to respond to a potential spill

2.2.1.3.2 Fire

33. Stop work, shut down equipment, and if safe to do so close valves, plug hoses, etc.

34. All vehicles and equipment will be equipped with fire extinguishers, shovels, and other appropriate fire suppression equipment. Personnel will have training in the use of fire suppression equipment

35. Call 911 if the fire requires additional support

36. Immediately notify the Contractor(s) and GECGP

37. Review incident with the Contractor(s) and GECGP to determine if changes to procedures are required

38. Implement corrective action to prevent recurrence of incident and revise the EPP as required

2.2.2 Fuel Handling and Storage

Fuel and other equipment maintenance fluids are hazardous materials that are required during all construction activities. Proper handling and storage measures are required to help prevent an environmental incident.

39. Equipment will be inspected prior to bringing to the PDA. Documentation of inspections will be maintained in the main Contractor(s) on-site office

40. Contractor(s) personnel are to be trained in refueling, maintenance, and spill response procedures and will be present at the transfer point for the duration of the fueling process

41. Spill kits and drip pads will be present during refueling

42. Fuel will be stored in jerry cans, fuel cubes, and slip-tanks, within vehicles and on-site storage containers (sea-cans). Any fuel in sea-cans will be stored/placed within secondary containment having 110% of the capacity of the largest vessel inside the containment.

43. Refueling, equipment maintenance, and other potentially contaminating activities will be limited to designated areas

44. Smoking will only be permitted in designated areas

45. Trucks or other road vehicles will be refueled and maintained off site, where practical. Should refuelling and maintenance be required on the PDA, it will be completed by a maintenance service vehicle in a designated area

46. All service vehicles used for refueling will have automatic shut-off valves and will be monitored by the operator at all times during refueling; operators are to be stationed at both ends of the hose during fueling unless both ends are visible and readily accessible by one operator; fuel remaining in the hose is to be returned to the storage tank

47. Regular inspections of hydraulic and fuel systems on machinery will take place and leaks will be repaired immediately upon detection or the equipment will be removed from the PDA

2.2.3 Contaminated Site Management

While no contaminated material is anticipated to be encountered during construction, the following actions will be utilized for chance encounters:

48. Workers will be trained to recognize the signs of possible contamination and immediately report them

49. Environmental Awareness training will be the responsibility of and provided by the Contractor(s)

50. Stop work and secure the area if indications of possible contamination are found, including but not limited to:

    - Stained or discolored earth
    - Non-earthy odors
    - Oily residue
    - Sheen on water
    - Cinders or other combustion products
    - Tanks or pipes
    - Debris or trash of any kind

51. Notify the:

    - Contractor(s)
    - Fire Emergency (911), if necessary
    - GECGP
    - The EI
    - AEPA, if determined to be reportable

52. A QP, in consultation with GECGP, will assess contaminated or suspected contaminated materials to determine if conditions are suitable to resume work

53. A QP will assess the suspected contaminated materials and plan for the removal and disposal, if it is required

54. Impacted soils will be stored on top of liners temporarily to separate them from the underlying soils and be covered by tarps to prevent potential leachate runoff from stockpiles during wet (rain/melting snow) conditions

    - Soil waste characterization will be required to determine whether impacted soils must be handled and disposed of as non-hazardous material at a Class II (non-hazardous) waste management facility, as hazardous material disposed at a Class I (hazardous) waste management facility, or whether the soils meet acceptable quality guidelines to allow the soil to be reused on-site

55. If dust or odour from the contaminated site is of concern to on-site or surrounding receptors, dust and odour suppression techniques will be employed by the Contractor(s) as necessary to mitigate fugitive dust/odours from unvegetated or disturbed areas during the work program. Techniques to be used may include one or more of the following:

    - Wetting equipment and/or excavation faces
    - Spraying water on excavator buckets during excavation and dumping

- Hauling materials in properly tarped vehicles
- Restricting vehicle speed
- Covering excavated areas and materials after excavation activity ceases
- Reducing the excavation size

2.3 Vegetation, Weed and Pest Management and Control

2.3.1 General Vegetation Management

56. All vehicle traffic will stay on designated access roads and workspaces

57. Clearing or grubbing beyond the marked construction boundaries will not be allowed

58. Exposed surfaces of permanently disturbed areas will be covered with mulch or a stone layer or revegetated after construction to reduce the proliferation of invasive species

59. Equipment (e.g., vehicles, materials, matting, etc.) will arrive for work in a clean condition free of soil or vegetative debris, and in good working condition free of leaks to reduce the risk of introduction of weeds or soil pathogens, or contaminants (see the Clubroot Management Plan for more details on soil pathogen management and monitoring)

60. Vehicles and equipment that have been working on-site will be clean and free from topsoil, weeds, or weed seeds before they leave the PDA

61. Rig matting will be used to reduce soil compaction where wet soil is present and where soil stripping is not completed

62. Topsoil windrows will be monitored for weed growth during nonfrozen soil conditions and implement corrective measures, if warranted

63. Weed monitoring, soil pathogen testing, and control measures will be implemented during construction and operation, as required and deemed necessary by the construction inspector and/or QR

64. Clean-up activities will be implemented following completion of construction

65. Merchantable timber will be salvaged from areas of planned disturbance prior to construction; non-merchantable timber will be retained or used as erosion control on soil stockpiles as appropriate

66. Schedule vegetation clearing and wetland removal outside of the breeding period for migratory birds, raptors, and amphibians (March 15 to September 15, inclusive), when feasible.

67. GECGP or the Contractor(s) will carry out weed control and pest management activities in compliance with the *Weed Control Act* and the *Agricultural Pests Act*

68. Equipment and materials, including mats, will be properly and thoroughly cleaned prior to entering the construction site

69. Vehicles will be free of mud, soil buildup, vegetative material or debris that may contain weed seeds or controlled pests prior to leaving the construction site; Specifically:

    - All construction equipment will be pressure washed and enter the Project Area in a clean condition, free of dirt, mud, and vegetative materials to limit the potential for introduction of weeds and soil borne diseases

2.3.2 Weed and Pest Management

No prohibited noxious weeds were found during 2023 or 2025 surveys. There were five species of noxious weeds found on the PDA (common burdock [*Arctium minus*], creeping thistle [*Cirsium arvense*], field bindweed [*Convolvulus arvensis*], perennial sow-thistle [*Sonchus arvensis*], and white cockle [*Silene latifolia*]) found on the PDA. The Alberta *Weed Control Act* requires that noxious weeds be controlled and not allowed to spread from the property.

2.3.2.1 Weed Control Methods

The Contractor(s) and GECGP are responsible for controlling the spread of weeds in the PDA.

Contractor(s) responsibilities will include, but are not limited to:

70. Separating topsoil with identified infestations of weeds from topsoil that is weed free (e.g., if there is a small area where weeds have been identified during construction), topsoil from the immediate vicinity of the weeds will be stockpiled separately in the topsoil stockpiling areas, on a tarp to prevent the spread of weed seeds in the soil

71. Weed control will be completed when/as needed, by mechanical or chemical treatment

72. Should chemical control be carried out, it will be completed only by certified weed control personnel and with the approval of GECGP

73. Only provincially licensed individuals will apply the approved herbicides and will follow containment and removal methods pursuant to the Environmental Code of Practice for Pesticides and as defined by Alberta Regulation 43/1997

GECGP responsibilities will include, but are not limited to:

74. Monitoring to confirm that only certified weed-free seed mixes will be used during reseeding or reclamation

75. Eradication of prohibited noxious weeds and control of noxious weeds pursuant to Alberta *Weed Control Act*

2.3.2.2 Weed Monitoring

Regular weed monitoring is required during construction:

76. During construction, monitoring for weeds will be a part of regular weekly environmental monitoring of the PDA

2.3.2.3 Pest Control

Agricultural pests, as per the *Agricultural Pests Act* and Regulations have not been identified as being present within the Project area. However, if any areas are identified where pest management is required, a site-specific pest management plan will be prepared.

2.4 Wetlands and Drainages

Wetlands in Alberta have special protection under the *Water Act*. Forty-two wetlands and ephemeral waterbodies will be permanently affected by the Project. There will be a Water Act approval received prior to construction of the Project. To protect other wetlands in the vicinity of the Project from potential indirect effects, GECGP and the Contractor(s) will:

77. *Water Act* application and approval will be required for wetland areas which will be graded and removed, as well as any wetland permanently impacted by construction activities, including change to a catchment that alters a wetland. Wetlands permanently impacted from the PDA will be compensated for, as per the requirements of the Alberta Wetland Policy

78. Conduct construction activities and locate storage and disposal sites in a manner that prevents degradation of water quality and prevents sediment laden runoff, contaminants, debris, and other pollutants and wastes from entering drainages, wetlands, and underground water sources

79. Follow spill related protocols for releases near wetlands

80. Excavate away from wetlands and drainages to reduce introduction of soil and organic debris. No windrowed or fill material will be placed in or adjacent to wetlands or drainages during excavation activities

81. Maintain surface water drainage patterns during excavation activities

82. Dewatering of construction areas, if necessary, will be directed to areas that avoid effects to wetlands in proximity to the PDA

83. Erosion and surface water run-off control measures will be implemented, where and when required

84. Clearing of trees around surrounding retained wetlands will be limited to the area required to complete the construction

85. Vehicles and equipment will not be refueled or washed within 100 m of wetlands except as approved by GECGP or designate (e.g., for equipment washing stations).

86. Berms, cross ditches, sediment fencing and/or other appropriate measures will be used to prevent erosion and siltation into adjacent wetland areas

87. Construction activities will be conducted in a manner that prevents degradation of water quality and prevents sediment laden runoff, contaminants, debris, and other pollutants and wastes from entering drainage ditches, wetlands, and underground water sources

88. Any debris or releases inadvertently introduced into waterbodies will be immediately contained, and under the direction of a QP, cleaned up or removed and reported to the EI, Contractor(s) and GECGP

89. Construction activities will avoid working in wet areas and areas of poor drainage. If unavoidable (e.g., adjacent to existing wetlands that have not been a part of compensation), work will be completed under dry or frozen conditions or with the use of special equipment (e.g., low ground pressure equipment, rig mats). Site specific soil compaction and erosion control measures will also be considered. Topsoil and subsoil salvage will not be completed under frozen conditions

2.5 Wildlife Management

The following sections detail mitigation measures that will be utilized during construction to help to protect wildlife.

2.5.1 Wildlife Management

During the wildlife surveys completed for the Project in 2025 (Stantec 2025), no species of management concern were identified within the PDA.

2.5.1.1 General Wildlife Mitigation

90. Schedule vegetation clearing and wetland removal outside of the breeding period for migratory birds, raptors, and amphibians (March 15 to September 15, inclusive), when feasible. If construction activities or clearing occur during the migratory bird breeding period (April 15 to August 31) or raptor breeding period (March 15 to August 31), complete nest searches in suitable nesting habitat no more than 7 days prior to undertaking the activity. If an active nest is found, implement site specific mitigation (e.g., setback buffers) according to the direction of a qualified wildlife professional, or designate

91. Prior to start of clearing, clearly mark all sensitive resources and associated setbacks according to the Project specific documentation

92. Limit the amount of time that a trench is left open, or a barrier of trenches/open pits are left open to reduce and avoid entrapment of wildlife

93. Vegetation clearing will occur outside of the breeding period for migratory birds, raptors, and amphibians when feasible

94. If construction or clearing activities are planned during the active period for amphibians, install exclusion fencing near key amphibian habitat (e.g., suitable breeding wetland). Amphibian search, salvage, and relocation may be required and should be completed during the direction of a qualified wildlife professional

95. A daily survey of excavations and trenches (i.e., prior to construction each day) will be completed to verify that no wildlife has become trapped. In the case of trapped wildlife, contact a QP or designate

96. Establish construction traffic speed limits on vehicle travel routes and access roads to reduce the risk of collisions with wildlife

97. In the event of a discovery of a wildlife species at risk or species of management concern, or key habitat features during construction, report sightings to the QP. Appropriate mitigation measures will be established in consultation with the QP, qualified wildlife professional and the appropriate regulatory authorities, if warranted

98. An assessment of construction traffic will be completed prior to the start of construction and will inform any additional mitigation measures necessary

99. All construction traffic will adhere to safety and road closure regulations.

100. Do not harass or feed wildlife. Personnel are prohibited from hunting, possessing, or feeding wildlife on the PDA

101. Do not permit personnel to have dogs or other pets on the work area

102. A daily survey of excavations and trenches (i.e., prior to construction each day) will be completed to verify that no wildlife has become trapped. In the case of trapped wildlife, contact the Environmental Inspector, Construction Inspector or designate

2.5.1.2 Migratory Birds and Raptors

To avoid the migratory bird Primary Nesting Period (PNP) for Zone B4 (mid-April to late August; Environment and Climate Change Canada 2025), as well as the recommended restricted activity periods (RAPs) for raptors, construction activities will avoid the schedule vegetation clearing and wetland removal outside of the breeding period for migratory birds, raptors, and amphibians (March 15 to September 15, inclusive), when feasible, to the extent possible. If vegetation clearing activities are not completed prior to March, additional mitigation includes:

103. If it becomes necessary to alter the Project schedule due to unanticipated events to allow for construction between March 15 to September 15, mowing and/or clearing will be completed prior to March 15 and construction will be conducted prior to vegetation regrowth to reduce the possibility of impacting active nesting habitat and nesting birds

104. In the event vegetation clearing and/or other construction activities are scheduled to occur within the RAP for breeding birds, a bird nest search will be conducted by or under the direction of an experienced wildlife biologist no more than 7 days prior to commencement of construction activities; memos detailing the timing and finding of each nest sweep will be kept as records

105. If during the nest search an active nest is detected, a species specific setback (minimum 100 m) will be applied until young fledge, as directed by an experienced wildlife biologist

106. Nest status will be checked after the anticipated end date (i.e., when the young have fledged), confirmed by an experienced wildlife biologist or designate; the experienced wildlife biologist (or designate) will have stop-work authority

107. Vehicle traffic along existing trails or foot traffic by surveyors or construction crews will not require a nest search

108. If there is ongoing construction or reclamation work within 100 m (or at the discretion of an experienced wildlife biologist) of suitable nesting habitat that was initiated prior to March 15, work may continue unless a breeding bird exhibits defensive behavior within 100 m of the disturbance; in this case, a nest search will occur to determine if an active nest is present within 100 m of the disturbance and setbacks would apply if a nest is found

109. Should a raptor nest be observed within a required species specific setback (minimum 100 m), a QP will determine appropriate setbacks and mitigations.

2.6 Soil Management, Erosion and Sediment Control

Planning and site management are important factors for protecting against erosion and sedimentation. The following measures are best management practices (BMPs) to be utilized by the chosen Contractor(s) as temporary ESC measures during construction and are recommended to help to conserve soil quality and quantity and to protect against a release of sediment to the environment.

2.6.1 Construction Schedule

Project scheduling can be a tool for reducing erosion and sedimentation. Construction of the Project is anticipated to start in 2026, with construction completion to accommodate the facility operating in 2029. Project work will be scheduled to give priority to the following:

110. During construction, if areas are disturbed and require re-seeding and landscaping, re-seeding will be completed as soon as possible after construction in each area of the PDA is completed

111. Wet weather should be anticipated, and measures to reduce erosion and sedimentation will be incorporated prior to forecast heavy rainfalls

112. Construction activities during extreme wet weather will be curtailed to reduce erosion potential and soil compaction (e.g., wet soil is more prone to compaction and activity on wet soil loosens the soil and promotes erosion if running water/stormwater runoff is present)

2.6.2 Erosion Events

If wind or water erosion is evident, GECGP and/or applicable Contractor(s) and the EI and will determine appropriate procedures to be implemented to control the erosion. Erosion control will be implemented as follows:

113. Stop work in the source (eroding) area

114. Install quick response measures (e.g., mulch, slash, straw, plastic cover, temporary drains, rock check dams, water diversions, etc.)

115. Contain sediment release and attempt to prevent further releases using berms, ditches, booms, silt fence, or other erosion and sediment control (ESC) measures

116. Measures taken must not compromise road and public safety

117. Immediately notify the EI and Contractor(s) and GECGP of all erosion events

118. If the sediment release has or might have an adverse environmental effect, the EI and Contractor(s) is responsible to report to AEPA

2.6.3 Runoff Management

On-site drainage will be managed with a stormwater pond. The area within the PDA will be graded to direct industrial surface runoff to the stormwater pond. During construction, stormwater runoff will be directed away from the active construction area or conveyed though the PDA in an armoured ditch to the stormwater pond.

119. Diversion berms, cross trenches, check dams, and interceptor swales will be used to control runoff on, around, and through the active construction area, as required

120. ESC measures should be installed as per manufacturer's requirements and should only be removed once the disturbance area is stabilized

2.6.4 Protection of Disturbed Soil

Disturbed areas are more likely to erode, resulting in potential sediment releases. Disturbed soil should be managed as soon as is practicable. There are several BMPs that can be used to prevent erosion of disturbed areas during construction:

121. Maintain an intact ground surface in areas where grading is not warranted

122. Suspend motorized vehicle traffic during excessively wet soil conditions and/or if the potential exists for topsoil/subsoil mixing due to rutting. Confine traffic to well-sodded, well drained, or frozen lands during wet soil conditions to reduce compaction, rutting or loss of soil structure

123. Regrade areas with vehicle ruts, erosion gullies or where the trench / excavations have settled

124. Salvage topsoil during construction to preserve soil quality as indicated in the Topsoil Conservation Management Plan that will be developed including storing topsoil and subsoil separately and conducting alternative soil handling procedures in areas with problem soils

125. The EI or a qualified environmental professional (or designate) will be on-site during construction to monitor, direct, and confirm salvage procedures in the Topsoil Conservation Management Plan in such a way that reduce admixing of strongly contrasting qualities of soil profiles

126. Salvaged soils are not to be located in low areas that could be affected by spring break-up

127. Regrade areas with vehicle ruts, erosion gullies or where the trench has settled. When required, the replaced seedbed will be scarified to facilitate lodging and germination of seed

128. Following an adverse weather event, the EI or designate) will confirm the efficacy of ESC measures whether corrective action is required

129. Grades will be restored and surface water drainage patterns will be re-established to pre-construction contours or stable grade unless otherwise directed by the appropriate regulatory body

130. A Soils Contingency Plan will be developed. In the event soil suspected to be contaminated is encountered during construction, the Soils Contingency Plan will be implemented

131. All disturbed locations that are not under active construction (no disturbance anticipated for at least 7 days) will be roughened via track-walking perpendicular to any slopes or disced to create a rough surface. This BMP will help slow water flow over the disturbed areas and increase water infiltration

132. In the event of water erosion, or in areas where water erosion is of concern, implement one or more of the following mitigations as required:

    - Where topsoil has been stripped, construct temporary cross ditches / swales or berms of subsoil to direct runoff to sediment control measures (e.g. silt fence)
    - Install temporary rock check dams and/or permeable synthetic berms in swales (where appropriate) to help attenuate flows, reduce erosive velocities, and encourage sediment deposition
    - Install silt fence and/or erosion control fabric where practical and appropriate; silt fence will not be installed under conditions of flowing water
    - Re-grade rill or gully erosion (using material that was eroded, e.g., if topsoil has eroded, rills/gullies will be filled with topsoil)
    - If necessary, seed an annual cover crop as determined through consultation with the landowner to help prevent further wind and water erosion

133. Contractor(s) will make available personnel and equipment to control erosion or sedimentation when warranted

134. If a severe erosion and sedimentation event occurs on the PDA, GECGP will be consulted to implement site specific ESC measures

135. Diversion berms, cross trenches, check dams, and interceptor swales will be used to control runoff on, around, and through the active construction area, as required

136. Diversion ditches and dispersion aprons, gravel sheeting, mulch, erosion control blankets, permeable berms, sediment traps and settling ponds may be used for erosion and sediment control

137. Preventing disturbance to existing vegetation unless required for construction

138. Decreasing exposure time of un-vegetated and exposed soils

139. Re-vegetate disturbed areas as soon as conditions allow

140. Topsoil salvage and/or replacement will be avoided during heavy precipitation or extremely windy conditions

141. After topsoil replacement, if wind erosion is a concern, in consultation with GECGP, implement mitigation as required for the site specific issue, which may include:

    - Soil wetting with water
    - Applying straw crimping
    - Applying a hydro-mulch or tackifier, with a seed blend that is appropriate for erosion control and in consultation with the landowner

142. ESC measures will be regularly inspected and during or immediately following heavy rainfall events

143. Soil stockpiles will be located on stable foundations and will be sloped to prevent erosion and sloughing

144. ESC measures (such as silt fence, wattles, slope roughening, or temporary cover with mulch) will be implemented on all short-term soil stockpiles; long term soil stockpiles shall be seeded

145. Create breaks in topsoil and subsoil/spoil piles where natural drainages exist to allow surface runoff to flow across the active construction area and reduce water erosion

146. Surface water drainage patterns will be maintained during excavation activities and erosion and surface water run-off control measures will be implemented, where and when required

147. Topsoil and subsoil stored within 30 m of a wetland will include appropriate ESC measures to prevent any discharge to the wetland

148. Topsoil or subsoil will not be stripped under frozen conditions. Soil replacement may occur under frozen conditions. Should this occur, the following mitigations may be used:

    - Subsoil will be spread as evenly as possible. The subsoil depth may appear deeper than undisturbed soil, as frozen soil has more bulk than under non-frozen conditions
    - Large frozen clods will be broken up by track-walking over the replaced subsoil with a low ground pressure dozer
    - Topsoil will be replaced as evenly as possible, leaving an excess depth on the replaced area (minimum 10% more, as frozen soil has more bulk than under non-frozen conditions)

149. Soil compaction will be reduced through the following procedures and practices:

    - Strip topsoil and subsoil prior to equipment or vehicle traffic where compaction may be an issue
    - Restrict travel of heavy equipment to designated travel corridors and construction areas

- Restrict travel on sensitive soils (fine-textured, exposed with little vegetation, steep slopes, etc.) or during wet conditions
- De-compacting soil with an agricultural sub-soiler, followed by discing, chisel ploughing or cultivating to smooth the surface may be considered on a site specific basis

2.6.5 Dewatering

Dewatering may be required during construction.

150. Dewatering will not be done in a location where it will re-enter an excavation

151. Pump intake will be elevated from the bottom of the excavation to reduce the pumping of sediment

152. Hoses and pumps will be of sufficient length and capacity to transfer water to the desired location and will be in good working condition; hoses with tears or ruptures will be repaired or replaced

153. The outlet location will be protected to prevent erosion and will be regularly monitored to reduce the potential for a release of deleterious substances

154. The discharge location will be moved if conditions become saturated to the point that adequate natural filtration is no longer possible

155. Limit the amount of time that a trench /excavation is left open and the duration of dewatering events

156. Monitor water levels in all open excavations

157. Discharge water away from drainage courses, waterbodies and wetlands; appropriate locations for discharge will be identified during construction by the EI or designate

158. Monitor the water discharge site for signs of erosion, saturation of the discharge site or flow off of the approved release area. Suspend dewatering and apply erosion control measures, reduce the flow or move the discharge site if it appears that the above effects are occurring

2.6.6 Wet Weather Mitigation

The following measures will be implemented under wet weather conditions:

159. All personnel working on the construction of the Project have a responsibility to recognize and prevent impacts and damages to soils and vegetation associated with wet conditions

160. Wet weather shutdown practice will be followed if conditions deteriorate to a situation where ruts under vehicles become deep enough to cause topsoil/subsoil mixing, create excessive compaction, or make topsoil/subsoil separation too difficult

161. Under adverse weather conditions, soil stripping and excavation will be shut down until weather has improved and area is drained or de-watered.

162. When soils are susceptible to high risk to wind and water erosion during high winds and heavy rainfall events, excavation/dewatering/earthmoving activities will be stopped in consultation with GECGP

163. During poor weather conditions, the number of vehicles and traffic will be limited to essential vehicles and equipment only to limit erosion risks

164. Heavy equipment will be removed from sensitive areas during poor weather, if possible

2.6.7 Monitoring and Maintenance

All installed ESC measures must be monitored regularly. Monitoring of the temporary ESC measures will be conducted at least once weekly and maintenance will be completed when necessary, with additional monitoring following rainfall or snow melt events (any snowmelt, as frozen soil is highly susceptible to erosion). A report including information on recent weather, site conditions, conditions of ESC measures, and photos will be created for every monitoring event and kept on-site for review when required by GECGP. Appropriate follow up is to be conducted on any deficiencies noted during the monitoring events.

2.6.8 Soil Stripping and Excavation

Proper topsoil handling is a key mitigation to reduce potential effects on soils. Typical soil handling procedure will include the removal and separate stockpiling of topsoil, upper subsoil, and spoil. All soil handling activities will be monitored by GECGP or designate.

Approval for any extra laydown area outside of the approved PDA required for storage of topsoil, subsoil, or spoil during construction will be reviewed and approved by GECGP prior to disturbance.

General practices to reduce erosion, compaction, and land degradation include:

165. Completing construction under dry or frozen conditions (except for soil salvage, which will not be completed under frozen conditions) or with the use of special equipment that will not cause impacts to soil under wet and non-frozen conditions (e.g., low ground pressure equipment, rig mats). Site specific soil compaction and erosion control measures will also be considered

166. Ceasing construction during wet weather (e.g., heavy rainfall events)

167. Ceasing construction under high wind to reduce wind erosion

2.6.8.1 Soil Stripping Steps

Soil stripping may take place in the Laydown Area, for infrastructure construction, access roads, and pipeline trench excavations. Stripping depths will be determined in the field in consultation with GECGP. The steps are below:

168. Strip the topsoil (A horizon) from the entire workspace required and stockpile at the far edge of the PDA (there is no need to strip topsoil from topsoil stockpile locations) or along the access road or pipeline right-of-way (RoW)

169. Strip the subsoil (B horizon) and stockpile on the edge of the PDA, maintaining a minimum 1 m separation from the topsoil stockpile (reduced separation requirements must be approved by GECGP or designate)

170. Topsoil stripping will be required prior to subsoil stockpiling

171. If required, excavate the remaining material (spoil) and stockpile to the side

2.6.9 Soil Stockpiling

Soil stockpiling will be required for construction of the Project.

The length of time the stockpiles will be exposed to the environment will vary depending on the Project component. The Laydown Area is expected to have stockpiled soil for shorter durations than the access roads and Project infrastructure.

Temporary stockpiles will require mitigations for erosion. General mitigations for these short-term stockpiles include:

172. Grading stockpiles to a slope of 3:1 or less

173. Using silt fencing to reduce sedimentation

174. Using erosion control blankets, geotextile, mulch, or other covers in areas prone to wind and water erosion

175. Using stable (level) locations for stockpile locations (i.e., do not stockpile on a steep slope)

176. Longer term stockpiling will require seeding to a permanent cover in addition to those of the short-term stockpiles

2.7 Archaeological and Paleontological Monitoring and Chance Encounters

The required regulatory process for heritage resources within Alberta has been followed, as defined by the *Historical Resources Act* (HRA) and administered by Alberta Culture and Status of Women (ACSW). ACSW has issued an Approval (HRA 4940-25-0046-001) on July 10, 2025, with no conditions or requirements.

2.7.1 Chance Encounter Protocol

Under Section 31 of the HRA, any chance discoveries of archaeological, paleontological, or historic resources must be reported. If a previously unidentified historical resource is found during clearing or construction activities, implement the following mitigations:

177. Suspend work immediately near the newly discovered archaeological, paleontological, or historic site and notify GECGP, who will contact a QP

178. Flag/barricade the site in consultation with the QP to ensure that site integrity is maintained

179. Qualified archaeologist and/or paleontologist (QP) will complete an assessment of the site

180. If required, ACSW will be notified who may issue site requirements

2.8 Stormwater Management

Construction activities will be required to develop the PDA including grading, infrastructure installation, and general construction traffic. The activities may result in the disturbance of surface soils, exposing underlying earth to potential erosion and sediment transport to off-site locations.

A stormwater pond will be constructed to collect on-site drainage during operational activities. The area within the PDA of the Project will be graded to direct industrial surface runoff to the stormwater pond. Perimeter berms will provide run-on/run-off control to prevent runoff leaving the PDA and to prevent run-on from outside the PDA. The stormwater pond will be designed to collect surface water runoff and will be constructed with pond liners for the retention of liquids and prevention of leaching of water into local groundwater. Should the pond reach capacity, water would be stored in the ditch system leading to the pond allowing for excess water to be slowly released to the pond as the space becomes available. If the pond and ditches are full, excess water would be released to an adjacent location. Prior to release, GECGP would first test the water for compliance with *Environmental Protection and Enhancement Act* (EPEA) approval requirements. Should the water not meet these standards, GECGP would pump the water into a truck for it to be disposed at an approved disposal site. The release of stormwater will be designed to maintain existing drainage patterns so adjacent properties are not affected.

2.9 Fugitive Dust, Noise, and Emissions

2.9.1 Air Emissions

Mitigation measures related to air emissions from vehicles and equipment include:

181. Vehicles and equipment will be required to meet emission control standards including the on Road Vehicle and Engine Emission Regulations and the Off-road Compression Ignition (Mobile and Stationary) and Large Spark-Ignition Engine Emission Regulations

182. The concentration of sulphur in diesel fuel will not exceed 15 milligrams per kilogram (mg/kg) to comply with Sulphur in Diesel Fuel Regulations

183. Construction vehicle idling times will be reduced to the extent possible to reduce emissions, as a best management practice

184. Using multi-passenger vehicles to the extent practical

185. Equipment and vehicles will be maintained in good working order with functioning mufflers and emission control systems as available

186. As deemed appropriate by GECGP, records of vehicle maintenance shall be retained and made available by the Contractor(s) for periodic review by GECGP

2.9.2 Dust

Mitigation measures related to dust emissions include:

187. All work will be conducted in a manner that reduces the raising of dust from construction or maintenance operations

188. Dust control measures such as watering roads to suppress dust distribution and ceasing operations during periods of high winds will mitigate the distribution of particulate matter during construction activities

189. Disturbed surfaces will be revegetated promptly following construction to prevent wind erosion and to control dust

190. Surfaces of temporary soil and overburden stockpiles will be stabilized during extended periods between usage, by means of vegetating or covering the exposed surfaces

191. As appropriate, cover or otherwise contain loose materials that have potential to release airborne particulates during their transport, installation, or removal

192. As necessary, use water mist or calcium chloride dust suppressant on the work sites (calcium chloride will not be used on natural areas; only to be used on graveled access roads only)

193. As appropriate, protect stockpiles of friable material with a barrier, windscreen, or quick growing vegetation

194. Any open loads (soil, brush, debris, etc.) will be tarped if required

2.9.3 Noise

Mitigation measures related to noise emissions include:

195. Contractor(s) will be required to provide well maintained machinery and equipment with adequate noise suppression devices that meet current government requirements

196. Check that noise abatement equipment on vehicles and machinery is maintained in good working order

197. Reduce vehicle and equipment idling

198. Reduce construction staging and laydown areas to avoid or reduce adverse impact to sensitive receptors where possible

199. Install equipment enclosures for equipment such generators and compressors.

200. Minimize simultaneous operation of heavy equipment where possible (e.g., jackhammer and vacuum excavator)

201. Reroute construction and truck traffic, when possible

202. Residents near to high noise generating activities (e.g., pile driving) will be notified prior to construction

203. A complaint response procedure will be implemented to address noise complaints should they arise

204. Install a 4” thick envelope with 24ga exterior cladding, high density mineral wool insulation, and a perforated inside liner on turbine buildings to meet a sound transmission class 30 or above

205. Incorporating noise attenuation measures on air-cooled condensers during design to meet acoustic performance specified in noise impact assessment. This may include, but is not limited to, reducing fan speed, and using low-noise fan blades

206. Equipment and vehicles will be maintained in good working order with functioning mufflers and emission control systems as available

207. Construction will take place during regular construction hours (to be determined upon start of Project construction) with extended hours as necessary with permission from the municipality and GECGP

3 Clean-up and Reclamation

Conservation and reclamation for power projects involves conservation of soil, vegetation, and wetlands during construction; interim reclamation during operation; and final reclamation after decommissioning. After construction has completed, certain components of the Project will be ready for permanent reclamation, for example portions of the Laydown Areas. Areas disturbed during construction such as excavations, the sides of access roads, areas surrounding buildings and project pipelines will undergo interim reclamation. Soil will be replaced, contoured, and seeded appropriately (depending on Project requirements). Final reclamation will take place when all Project components are decommissioned and/or removed. Infrastructure will be removed (laydown areas, access roads, buildings, Project equipment), soils stripped and the landscape recontoured, and soils replaced and allowed to naturally regenerate to integrate into the natural surroundings. Once the PDA has returned to an equivalent land capability, GECGP will apply and receive a Reclamation Certificate for the Project.

Conservation and reclamation measures that need to be followed during construction of the Project are described below.

3.1 Soil Replacement

Soil replacement will be interim or permanent depending on the reason for the disturbance. For permanent soil replacement in the Laydown Area, general soil replacement is as follows:

208. Backfill excavated areas, then de-compact and recontour the spoil to the surrounding natural landscape

209. Spread the subsoil evenly over the spoil; excess subsoil will be feathered out where topsoil has been stripped

210. Spread topsoil over the subsoil

For areas where soil replacement is temporary (access roads and trenches, assuming they will be removed during decommissioning), the general soil replacement is as follows:

211. Backfill areas (along the sides of roads and above trenches) with spoil material and feather it to accommodate the surrounding topography

212. For pipelines, reduce the amount of open trench at any one time; the amount of open trench permitted at any one time will be determined by GECGP taking into consideration the stability of the trench, the prevailing weather conditions, safety, and environmental concerns

213. Where the trench is left open, consideration must be given to the protection and safety of wildlife and Project personnel (such consideration may include fencing, barricades, or signage)

214. Should a crown be required over a trench due to anticipated settling, leave breaks or gaps in the pipeline trench crown at obvious drainages and wherever seepage occurs to reduce interference with natural drainage; compact backfill where breaks have been left

215. Replace and feather the subsoil over the spoil

216. Replace and feather topsoil over the subsoil

3.2 Revegetation

Areas to be revegetated for interim reclamation (e.g., around operational buildings) will be seeded with certified seed mixed and will be similar in composition to the surrounding vegetation. Seed certificates will be submitted to and approved by GECGP. Reclamation for forested areas, where permitted by Project operational requirements, will consist of natural regeneration.

In some areas, such as around Project infrastructure, low maintenance vegetation may be established depending on Project requirements.

3.3 Cleanup

Cleanup activities are important for returning the construction site to a condition similar to preconstruction. If clean up activities occur in the winter, machine cleanup should occur immediately following the completion of construction and final cleanup occurring the following summer or as conditions permit (i.e., dry conditions). In general, cleanup activities will follow the same mitigation measures as described throughout the EPP, with the addition of the following:

217. Cleanup activities will occur immediately following the completion of construction. If cleanup cannot be completed before spring, machine cleanup should be initiated during frozen conditions and final cleanup will be completed in following summer or as conditions allow

218. If cleanup activities must be scheduled during the migratory bird RAP, follow Wildlife Management mitigations

219. Remove all flagging, signage, matting and geotextiles from the PDA once conditions allow (i.e., dry conditions)

220. Only use Certified No.1 seed mixes. If not available, determine appropriate seed mix with a QP or designate

221. If appropriate, use fencing to restrict access following seeding activities

3.4 Monitoring

During construction, soil stockpiles and exposed soil will be monitored for erosion and compaction risk. GECGP, the Contractor(s) and EI or designate will monitor these sites regularly and if any non-compliance issues are noted, the Contractor(s) will create an action plan to be carried out immediately.

Throughout the life of the Project, GECGP will monitor and manage weed control and pest management activities in compliance with the *Weed Control Act* and the *Agricultural Pests Act.*

3.5 Reclamation Certificate

Upon completion of operations (anticipated to be in operation for 30 years) and after infrastructure has been removed and soil and vegetation has returned to equivalent land capability (or reclaimed based on the requirements of the day), GECGP will apply for a Reclamation Certificate.

GECGP will comply with the Project's reclamation requirements as outlined in the EPEA approval.

4 Change Management

During the course of the Project, it may be necessary to modify or create new mitigation and/or procedures to address site conditions that have not been anticipated. This procedure outlines the process to be followed.

222. If deficiencies are noted and the BMPs that are utilized are not sufficient for the construction site, further ESC measures may be required. GECGP will be contacted for instruction regarding any additional measures.

223. Review incident response with the Contractor(s) and GECGP to determine if changes to procedures and/or mitigation are required

224. Implement corrective action to prevent recurrence of incident and revise EPP as required

225. GECGP is accountable to develop the modification to the work procedure and/or mitigation in cooperation with the Contractor(s)

5 References

AUC. 2024. Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, Hydro Developments and Gas Utility Pipelines. July 2025. Accessed online at https://www.auc.ab.ca/rule-007

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

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

Stantec (Stantec Consulting Ltd.). 2025. Wildlife and Wildlife Habitat Technical Data Report.

Government of Alberta (GOA). 2024. Alberta Tier 1 soil and groundwater remediation guidelines.

Appendix F Reclamation Security Estimation

August 18, 2025 Reference No. CA0053606.5349-TM-001-RevA

Rob Thomas, Director, Regulatory Services
Kineticor Asset Management
1410, 715-5 Avenue Southwest
Calgary, Alberta
T2P 2X6

GREENLIGHT PROJECT DEMOLITION & RECLAMATION ESTIMATE – CLASS 5

Mr. Thomas,

WSP Canada Inc. (WSP) has been retained by Kineticor Asset Management (Kineticor) to develop a demolition and reclamation cost estimate for the Greenlight Electricity Centre (GLEC) project near Gibbons, Alberta. In discussions with Kineticor, WSP understands that this estimate is to support construction permitting process with the provincial government, and the plant has not yet been constructed but it is planned to be a gas fired combined cycle plant with up to 4 combined cycle gas turbines (CCGT).

Estimate Classification

WSP develops our estimates in general accordance with the Association for Advancement of Cost Estimating (AACE) guidance and literature. Considering the current state of the project, and level of engineering defined to a detailed state, this estimate is classified as a Class 5 estimate.

AACE defines the accuracy of a Class 5 estimate as:

- Low: -20% to -50%
- High: +30% to +100%

Estimating Methodology

The developed estimate is a high-level estimate, completed primarily utilizing in house curated unit rates, and buildups from the catalogue of projects WSP has completed with similar site uses and geographic locations. Currently, there are no detailed design drawings of any kind for the GLEC. Sources of information are as follows:

- Information provided by Kineticor:
  - Site concept drawings for Greenlight land parcel.
  - Some design drawings for the Cascade Project (a similar CCGT plant constructed and in operation near Edson, Alberta). This information was utilized to help benchmark quantities and general finished layout.

- In house information and data belonging to WSP.

The presented estimate is a hybrid of some first principles buildup, unit rate buildups and professional judgement. Any first principles buildup includes labour and equipment rates in line with current demolition Canadian market trends. Equipment rates are also fully burdened with fuel and operators.

Other items are based on rates developed or procured from other similar projects. There are some allowances included based on professional judgement of expected scopes of work.

Estimate Summary

Table 1 below shows the final buildup on the Class 5 estimate for the GLEC project:

Table 1: Greenlight Project Demolition & Reclamation Estimate

Item	Item Description	Estimated Cost (CAD)[1]
1	Demolition of CCGT (4 Units)	$2,750,000.00
2	Demolition of Condenser (4 Units)	$1,820,000.00
3	Demolition of Operations Building	$500,000.00
4	Demolition of Common Services Building	$210,000.00
5	Demolition of Switchyard	$150,000.00
6	Hardtop & Fencing Removal	$2,100,000.00
7	Utility Decommissioning	$420,000.00
8	Site Grading	$8,950,000.00
9	Revegetation	$1,720,000.00
10	Mobilization / Demobilization	$740,000.00
11	Contractor Overhead & Profit	$2,780,000.00
12	Engineering & Design	$560,000.00
13	Contractor Management	$810,000.00
14	Contingency (30%)	$7,030,000.00
TOTAL		$30,540,000.00

1) All values rounded to the nearest $10,000.00

Assumptions

The delivery of this memorandum and its contents considers the following assumptions:

1) The decommissioning, reclamation and salvage estimate assumed that the facility is demolished and salvaged as a single project at the time that the last unit at the site is retired. No interim demolition, reclamation or salvage activities will occur while any units at the site continue to operate.

2) The Plant will be decommissioned to zero generating output. Existing utilities will remain in place within the property boundary.

    a. Utilities are assumed to be terminated inboard of the legal property boundary.

3) Cost estimate does not consider operational ramp down or cleaning, flushing, draining of vessels and pipes on the site.

4) Cost estimate does not consider stakeholder engagement, and costs incurred from any third-party oversight (i.e. ATCO Gas), access agreements likely required to execute the work.

5) Demolition will include the removal of all above grade structures, tanks, ancillary buildings, and other infrastructure on the site.

6) No net positive salvage of scrap steel costs is considered in this estimate. Valuations of scrap steel are highly volatile and can be expected to fluctuate on a routine basis. As the detailed design has not yet commenced, there is no real actionable information to support development of a salvage cost for the project.

7) The site will be graded to achieve suitable site drainage for natural drainage patterns. Grading will include actions to replace stripped subsoils and topsoil, revegetate, and manage weeds.

8) Market conditions may result in cost variations at the time of the decommissioning and reclamation contract execution. Estimates have been provided in 2025 Canadian dollars.

9) No hazardous building materials are considered in the construction of this plant; thus, no abatement work is considered to be required.

10) This estimate is considered Class 5 in line with AACE guiding literature.

11) WSP has included for a 30% contingency on the total estimate costs.

12) Indirect costs are calculated as a percentage of the total direct costs.

Closure

We trust that the following meets with your requirements. Should you have any questions with respect to the contents of this report, please contact the undersigned at your earliest convenience.

Sincerely,

WSP Canada Inc.

Nick Kicz, P.Eng.
Senior Construction Engineer

Marc Schwerzmann, P.Eng.
Senior Principal Construction Engineer

NFK/

https://wsponlinecan.sharepoint.com/sites/ca-ca0053606.5349/shared documents/05. technical/5.27 environmental reclamation estimate/ca0053606.5349 - kineticor greenlight d+r estimate memorandum.docx

Appendix G Noise Impact Assessment

Greenlight Electricity Center
Noise Impact Assessment

August 20, 2025

Prepared for:
Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP.

Prepared by:
Stantec Consulting Ltd.

Project/File:
123514064

Stantec

Limitations and Sign-off

This document entitled “Greenlight Electricity Center Noise Impact Assessment” was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP. (the “Client”). The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by:

Yong Ma, P.Eng.
Digitally signed by Yong Ma, P.Eng.
Date: 2025.08.20 15:08:53 -06'00'

Signature

Yong Ma, P.Eng.
Printed Name

Reviewed by:

Jonathan Chu Wan Chui -- P. Eng. - APEGA
Digitally signed by Jonathan Chu Wan Chui -- P. Eng. - APEGA

Signature

Jonathan Chui, P.Eng.
Printed Name

Approved by:

Mathew, Ashley
Digitally signed by Mathew, Ashley
Date: 2025.08.21 08:07:18 -06'00'

Signature

Ashley Mathew, P.Eng.
Printed Name

Executive Summary

Greenlight Electricity Centre GP Ltd. (GECGP), on behalf of Greenlight Electricity Centre LP. retained Stantec Consulting Ltd. (Stantec) to conduct a noise impact assessment (NIA) for their Greenlight Electricity Center (the Project). The Project is located in the northeast quarter-section of Section 10 Township 56 Range 10, W4M, approximately 14 km northeast of Edmonton, Alberta. The Project is situated within the Alberta Industrial Heartland – Designated Industrial Zone (AIH-DIZ).

The Project will consist of four 1x1 Siemens SCC6-8000H natural gas fired gas/steam turbine units operating in combined cycle. Each unit has a nominal output of 466 megawatts (MW), for a total plant output of 1864 MW.

Stantec developed this NIA for the Project in support of its regulatory application to the Alberta Utilities Commission (AUC). The NIA will be conducted in accordance with the requirements in AUC Rule012: Noise Control, September 30, 2024 (AUC Rule 012) with consideration of the Northeast Capital Industrial Association (NCIA) Regional Noise Management Plan (RNMP). The purpose of this NIA is to quantify the Project noise effects at the “most affected” residential receptor and assess the compliance with the AUC Rule 012 requirements.

There is one residential dwelling (R1) identified within the 1.5 km local assessment area, located at approximately 860 m northwest from the Project boundary. Permissible Sound Levels (PSL) are determined as 55 dBA daytime and 45 dBA nighttime at R1. R1 is located at approximately 380 m north from Highway 643 - a heavily travelled road. Noise effect from the Project is assessed through Baseline Case, Project Case and Application Case approaches. Baseline Case includes the noise effect from the Ambient Sound Level (ASL) and other third-party regulated existing energy related facilities, approved but not yet constructed energy-related facilities, and proposed energy-related facilities that have been deemed complete under applications to AUC; Project Case includes noise effect from the Project only; and Application Case assesses the cumulative noise effect including the contribution from the Baseline Case and the Project Case. The cumulative sound levels at the receptor are determined by combining the noise contribution from Baseline Case and Project Case noise effects.

The daytime and nighttime cumulative sound levels at the location R1 are 50.4 dBA and 43.1 dBA, respectively. The results are below the daytime and nighttime PSLs. Low-frequency noise (LFN) effect was assessed based on methods prescribed in AUC Rule 012. LFN effect is not expected at the residential receptor.

This NIA concludes that the Greenlight Electricity Center complies with the AUC Rule 012 requirements.

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Acronyms / Abbreviations

°C	degrees Celsius
ACC	Air Cooled Condenser
AER	Alberta Energy Regulator
AIH-DIZ	Alberta Industrial Heartland – Designated Industrial Zone
APEGA	Association of Professional Engineers and Geoscientists of Alberta
ASDT	Average Annual Summer Daily Traffic
ASL	Ambient Sound Level
AUC	Alberta Utility Commission
BFWP	boiler feed water pump
BSL	Basic Sound Level
CSL	Comprehensive Sound Level
dB	Decibel
dBA	A-Weighted Decibel
dBC	C-Weighted Decibel
GECGP	Greenlight Electricity Center GP Ltd.
GSU	generator step-up
GT	Gas Turbine
HRSG	Heat Recovery Steam Generators
Hz	Hertz
INCE	Institute of Noise Control Engineers of the USA
ISO	International Organization for Standardization
km	kilometre
L_{eq}	Energy Equivalent Sound Level
LAA	local assessment area
LFN	Low frequency noise
m	metre
m/s	metres per second
MW	megawatt
NCIA	Northeast Capital Industrial Association

NIA	Noise Impact Assessment
PSL	Permissible Sound Level
PWL	Sound Power Level re 10^{-12} Watt
R1	one noise receptor
RAA	regional assessment area
RNM	Regional Noise Model
RNMP	Regional Noise Management Plan
Rule 012	AUC Rule 012: *Noise Control*
SPL	Sound Pressure Level re 20 µPa
ST	Steam Turbine
Stantec	Stantec Consulting Ltd.
STC	sound transmission class
the Project	Greenlight Electricity Center Project
UTM	Universal Transverse Mercator

Glossary

Term	Definition
Ambient Noise	All noises that exist in an area and are not related to a facility. Ambient noise includes sound from other industrial noise not being measured, transportation sources, animals, and nature. Ambient noise is the same as background sound level.
Ambient Sound Level (ASL)	The ASL consists of all noise in an area that is not related to regulated facilities. This noise includes sound from other non-regulated industrial facilities, transportation sources, animals and nature. The ASL does not include any energy-related industrial component and must be measured without it. The ASL can be measured when the sound level in an area is not felt to be represented by the basic sound levels (BSLs). The ASL must be measured under representative conditions. As with comprehensive sound levels, representative conditions do not constitute absolute worst-case conditions (i.e., the quietest day in this case) but conditions that portray typical conditions for the area.
Background Sound Level (i.e., Baseline)	It includes noise from all sources other than the sound of interest (i.e., sound from other industrial noise not being measured, transportation sources, animals, and nature).
Bands (octave, 1/3 octave)	A series of electronic filters separate sound into discrete frequency bands, making it possible to know how sound energy is distributed as a function of frequency. Each octave band has a centre frequency that is double the centre frequency of the octave band preceding it.
Basic Sound Level (BSL)	The A-weighted Leq sound level commonly observed to occur in the designated land-use categories with industrial presence. The BSL is assumed to be 5 decibel sound pressure level (dBA) above the ASL and is set out in Table 1 of AUC Rule 012.
Category	A classification of a dwelling unit in relation to transportation routes used to arrive at a BSL.

Term	Definition
Class A Adjustment	Consists of the sum of adjustments that account for the seasonal nature of the noise source, absence of both tonal and impulse/impact components, and the actual ASL in an area. It cannot exceed +10 dBA. The Class A adjustment is added to the BSL, the daytime adjustment, and the Class B adjustment to arrive at a permissible sound level.
Class B Adjustment	An adjustment based on the duration of a noisy activity that recognizes that additional noise can be tolerated if it is known that the duration will be limited. An adjustment of B1, B2, B3, or B4 may be selected as applicable.
Comprehensive Sound Level (CSL)	The sound level that is a composite of different airborne sounds from many sources far away from and near the point of measurement. The CSL does include industrial components and must be measured with them, but it should exclude abnormal noise events.
Daytime	The hours from 07:00 to 22:00.
Daytime Adjustment	An adjustment that allows a 10 dBA increase because daytime sound levels are generally about 10 dBA higher than nighttime values.
dB - Decibel	A logarithmic unit associated with sound pressure levels and sound power levels.
dBA - Decibel, A-Weighted	A logarithmic unit where the recorded sound has been filtered using the A frequency weighting scale. A-weighting somewhat mimics the response of the human ear to sounds at different frequencies. A-weighted sound pressure levels are denoted by the suffix ‘A’ (i.e., dBA), and the term pressure is normally omitted from the description (i.e., sound level or noise level).
dBC - Decibel, C-Weighted	The logarithmic units associated with a sound pressure level, where the sound pressure signals has been filtered using a frequency weighting. The C-weighting approximates the sensitivity of human hearing at industrial noise levels (above about 85 dBA). C-weighted sound pressure levels are denoted by the suffix ‘C’ (i.e., dBC). C-weighted levels are often used in low-frequency noise analysis, as the filtering effect is nearly flat at lower frequencies.

Term	Definition
Decibel Addition	In acoustics, due to the logarithmic nature of the decibel scale, the addition of two or more sound pressure levels (denoted as SPL_1, SPL_2 … SPL_n) is done as follows: $SPL_1 + SPL_2 + \ldots SPL_n = 10 \log (10^{(SPL1/10)} + 10^{(SPL2/10)} + \ldots + 10^{(SPLn/10)})$ As an example: 50 dB + 50 dB = 53 dB
Dwelling Unit	Any permanently or seasonally occupied structure used for habitation for the purpose of human rest; including a nursing home or hospital with the exception of an employee or worker residence, dormitory, or construction camp located within an energy-related industrial plant boundary. Trailer parks and campgrounds may qualify as a dwelling if it can be demonstrated that they are in regular and consistent use. In the case of a condominium or apartment complex, each unit is considered a dwelling.
Dwelling Unit (most affected)	The most impacted dwelling(s) are those subject to the highest average weighted sound level relative to the permissible sound level. The nearest dwelling unit may not necessarily be the one most adversely affected because of factors such as topography or man-made features. For example, the nearest dwelling unit to a facility may be located behind an intervening ridge, while a more distant dwelling unit may be in direct line of sight with the facility. Care must be taken in determining the most impacted dwelling unit.
Energy Equivalent Sound Level (L_{eq})	An energy-average sound level taken over a specified period of time. It represents the average sound pressure encountered for the period. The time period is often added as a suffix to the label (e.g., $L_{eq}(24)$ for the 24-hour equivalent sound level). L_{eq} is usually A-weighted. An L_{eq} value expressed in dBA is a good, single value descriptor of the annoyance of noise.
Frequency	Number of cycles per unit of time. In acoustics, frequency is expressed in hertz (Hz), i.e. cycles per second.

Term	Definition
Frequent Aircraft Flyovers	Used in the assessment of categories as part of a site specific analysis for dwellings that lie within a contour area with a noise exposure forecast (NEF) 25 or greater, as designated by Transport Canada. In the absence of any NEF contours for local airport, Transport Canada is to be contacted for current air traffic statistics. In this case, to qualify for the BSL adjustment, a dwelling must be within 5 km of an airport that has a minimum of nine aircraft takeoffs or landings over the nighttime period.
Heavily Travelled Road	Generally, includes highways and any other road where the average traffic count is at least 10 vehicles per hour over the nighttime period. It is acknowledged that highways are sometimes lightly travelled during the nighttime period, which is usually the period of greatest concern.
Hertz (Hz)	Unit of measurement of frequency, numerically equal to cycles per second.
Low Frequency Noise (LFN)	Noise in the low frequency range (AUC definition), 20 Hz up to 250 Hz, where a clear tone is present below and including 250 Hz and the difference between the overall C-weighted sound level and the overall A-weighted sound level exceeds 20 dB.
Nighttime	The hours from 22:00 to 07:00.
Noise	Unwanted sound.
Noise Level	Same as Sound Level, except applied to unwanted sounds
No net increase	The logarithmic addition of sound pressure levels when predicting noise where the sum does not exceed the permissible sound level by more than 0.4 dB.
Permanent Facility	Any existing or proposed facility that will be at a location longer than two months.
Permissible Sound Level (PSL)	The maximum sound level that a facility should not exceed at a point 15 m from the nearest or most impacted dwelling unit. The PSL is the sum of the BSL, daytime adjustment, Class A adjustment, and Class B adjustment.
Sound	A dynamic (fluctuating) pressure.

Term	Definition
Sound Pressure Level (SPL)	The logarithmic ratio of the root mean square sound pressure to the sound pressure at the threshold of hearing. The sound pressure level is defined by equation below where P is the RMS pressure due to a sound and P_0 is the reference pressure. P_0 is usually taken as 2.0×10^{-5} Pascals. SPL (dB) = $20 \log(P_{RMS}/P_0)$
Sound Power Level (PWL)	The logarithmic ratio of the instantaneous sound power of a noise source to that of the reference power. The sound power level is defined by equation below where W is the sound power of the source in watts, and Wo is the reference power of 10^{-12} watts. PWL (dB) = $10 \log(W/W_0)$
Spectrum	The description of a sound wave's resolution into its components of frequency and amplitude.
Tonal Components	Often industrial facilities exhibit tonal components. Examples of tonal components are transformer hum, sirens, and piping noise. The test for the presence of tonal components consists of two parts (as per tonality prescribed in AUC Rule 012). The first part must demonstrate that the sound pressure level of any one of the slow-response, A-weighted, 1/3-octave bands between 20 and 16 kHz is 10 dBA or more than the sound pressure level of at least one of the adjacent bands within two 1/3-octave bandwidths. In addition, there must be a minimum of a 5 dBA drop from the band containing the tone within 2 bandwidths on the opposite side. The second part is that the tonal component must be a pronounced peak clearly obvious within the spectrum.

1 Introduction

Greenlight Electricity Centre GP Ltd. (GECGP), on behalf of Greenlight Electricity Centre LP. retained Stantec Consulting Ltd. (Stantec) to conduct a noise impact assessment (NIA) for their Greenlight Electricity Center (the Project). The Project is located in the northeast quarter section of Section 10 Township 56 Range 10, W4M, at approximately 14 km northeast of Edmonton, Alberta. The Project is situated within the Alberta Industrial Heartland – Designated Industrial Zone (AIH-DIZ).

The Project will consist of four 1x1 Siemens SCC6-8000H natural gas fired gas/steam turbine units operating in combined cycle. Each unit has a nominal output of 466 megawatts (MW), for a total plant output of 1864 MW.

Stantec developed this NIA for the Project in support of its regulatory application to the Alberta Utilities Commission (AUC). The NIA will be conducted in accordance with the requirements of AUC Rule 012: Noise Control, September 30, 2024, (AUC Rule 012) with consideration of the Northeast Capital Industrial Association (NCIA) Regional Noise Management Plan (RNMP). The AUC and NCIA have worked together to manage noise effects from the regulated facilities within the AIH-DIZ. The assessment methodology and technical details of the assessment are included in this report. The NIA uses manufacturer noise emission data, engineering estimates, noise propagation modelling calculations, and NCIA Regional Noise Model (RNM) results to predict the cumulative noise level in the surrounding environment. The purpose of this NIA is to quantify the noise effects from the Project's design at the residential receptor and assess the compliance with the AUC Rule 012 requirements.

2 Study Area and Receptor

2.1 Study Area

The Project is located at NE-10-056-22-W4M and the northern portion of SE-10-056-22-W4M (the Project Development Area [PDA]), at approximately 14 km northeast of Edmonton, Alberta. The Project is situated in the AIH-DIZ area.

The local assessment area (LAA) is defined by a 1.5 km buffer area from the PDA boundary. This LAA boundary also represents the AUC 1.5 km criteria boundary.

The regional assessment area (RAA) is defined as the area which may be affected by environmental noise emissions from the Project. The RAA will extend 3 km from the PDA boundary to encompass noise effects from the Project as well as other AUC and Alberta Energy Regulator (AER) regulated facilities.

2.2 Noise Receptor

Permanent or seasonal residential dwellings within 1.5 km of the Project boundary were considered as noise receptors for this NIA. The AUC Rule 012 prescribes Permissible Sound Level (PSL) for noise receptors.

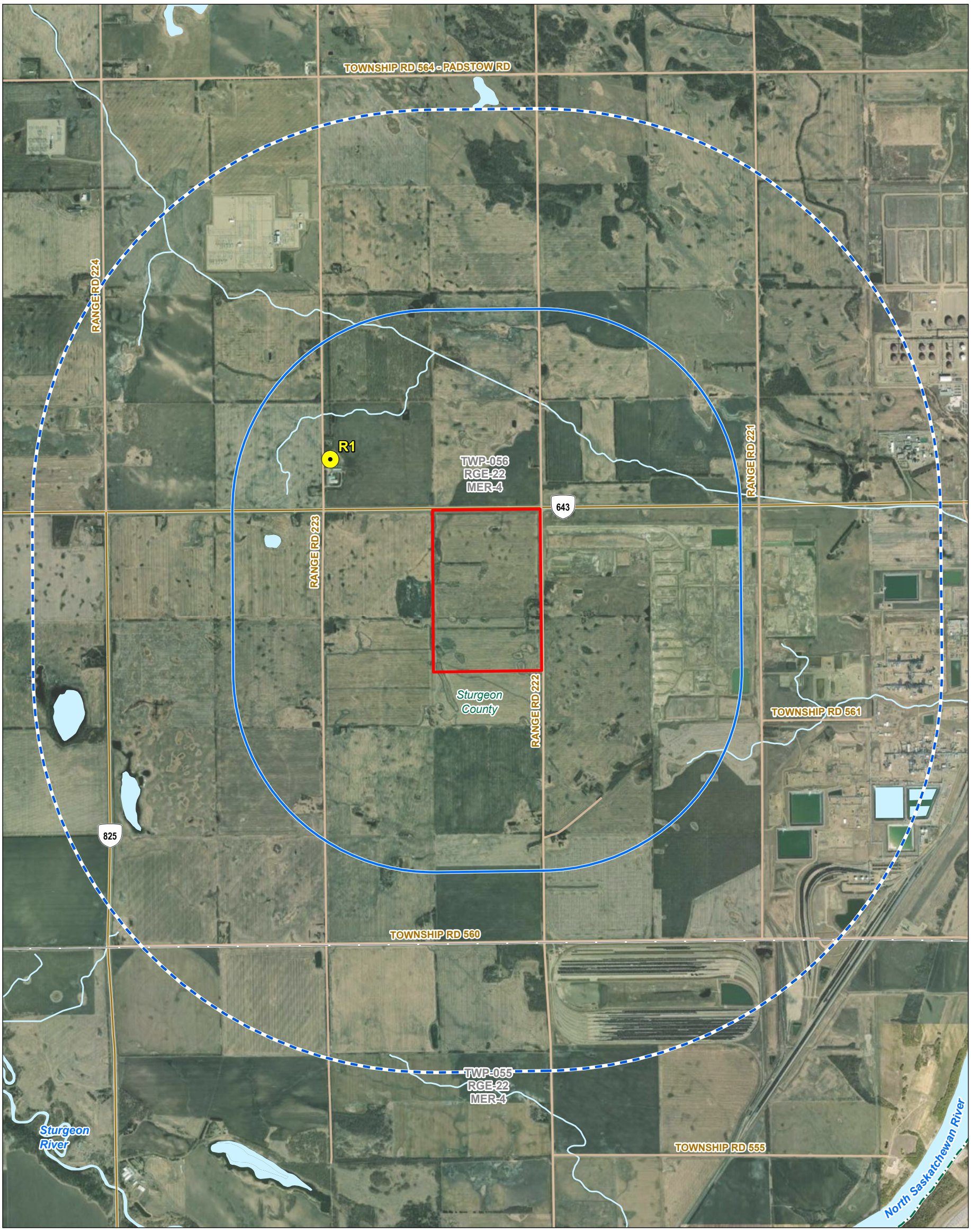
One noise receptor (R1) was identified within the 1.5 km LAA boundary. The receptor ID, location, and distance to the Project are presented in Table 1. Figure 1 shows the RAA, LAA, PDA, and the receptor location.

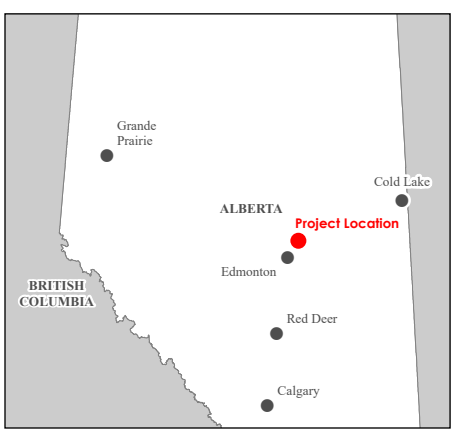
Table 1 Noise Receptor Location

Receptor ID	Description	Universal Transverse Mercator (UTM) Coordinates [1] (m)		Approximate Distance (m) and direction from Project
		Easting	Northing	
R1	Residential Dwelling approximately 380 m north from Highway 643	355362	5967524	860 Northwest

Note:

[1] UTM Zone 12U NAD 83





Receptor
Project Development Area
Local Assessment Area (1.5km)
Regional Assessment Area (3km)
Road
Watercourse
Waterbody

0 1 2
kilometres

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

N

Stantec

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

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

Prepared by NF on 2025-06-23

Client/Project
123514064-0001
Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP.
Greenlight Electricity Centre Project
Noise Impact Assessment

Figure No.
1

Title

Study Area and Receptor Locations

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3 Regulatory Framework

The AUC Rule 012 provides regulatory limits for the noise effects associated with energy related facilities. In this application, assessment criteria are applied in accordance with AUC Rule 012.

3.1 Permissible Sound Level (PSL)

In accordance with the AUC Rule 012, all regulated facilities must meet the daytime (07:00 to 22:00) and nighttime (22:00 to 07:00) PSL at a distance of 1.5 km (1.5 km criteria boundary) from the facility boundary or at the nearest residential dwelling, whichever is closer. Only structures that are permanently or seasonally occupied for habitation for the purpose of human rest are defined as dwellings. Exceptions to this definition include any employee or worker residence, dormitory, or construction camp located within an industrial energy-related plant boundary. A noise receptor is defined by Rule 012 as any dwelling located within 1.5 km of the facility boundary. If there are no dwellings within 1.5 km, a noise receptor is any point at 1.5 km from the facility boundary.

The determination of the daytime and nighttime PSLs at a receptor is based on the population density and proximity to transportation (i.e., proximity to heavily travelled roadways, rail lines, or frequent aircraft flyovers). The AUC Rule 012 defines the Ambient Sound Level (ASL) as the sound level that is a composite of different airborne sounds from many sources far away from and near the point of measurement. The AUC Rule 012 advises that the average rural ASL is 5 dB below the Basic Sound Level (BSL) of 50 decibel sound pressure level (dBA) and 40 dBA; therefore, the ASL of 45 dBA L_{eq} and 35 dBA are assumed for rural receptor with no adjustment for dwelling density or proximity to transportation. Using a similar approach, the ASL for the receptor of the Project with dwelling density or proximity to transportation adjustments are assumed to be 5 dB less than the BSLs. The PSL is the sum of BSL, daytime adjustment, Class A adjustment, and Class B adjustment. No Class A and Class B adjustments are applicable at the receptors for the Project. The daytime PSL is set at 10 dB above the nighttime value.

For the Project, receptor R1 is located along Range Road 223, west of Range Road 222, and approximately 380 m north from Highway 643. AUC Rule 012 defines heavily travelled roads as roads where 90 or more vehicles travel during the nine-hour nighttime period consistently for any one-month period in a year. The traffic volumes were validated by the Alberta Transportation's Average Annual Summer Daily Traffic (ASDT). To calculate the nighttime period traffic volume from ASDT, AUC Rule 012 prescribes that 10% of daily traffic volume can be assumed for the nighttime periods.

The ASDT Reference #997281 data for the intersection of Highway 643 and Range Road 222 indicates 5,010 vehicles per day for westbound traffic from this intersection along Highway 643 in 2024. The 2024 traffic ASDT volume data for the intersection of Highway 643 and Range Road 222 is included in Appendix A.

A conservative assumption of 90% and 10% split in traffic volume results in a presumed average nighttime traffic volume of 501 vehicles in 2024. This qualifies Highway 643 within the study area as a heavily traveled road as defined in AUC Rule 012. R1 is classified as “Category 2” because they are located more than 30 m but less than 500 m from Highway 643.

The population density, proximity to transportation category, PSL, and ASL values for the receptor R1 are summarized in in Table 2.

Table 2 Permissible Sound Level and Ambient Sound Level

Receptor ID	Dwelling Unit Density per Quarter Section[1] of land	Proximity to Transportation (Category)[2]	Ambient Sound Level [3] (dBA)		Permissible Sound Levels (dBA)	
			Daytime	Nighttime	Daytime	Nighttime
R1	1 to 8	2	50	40	55	45

Notes:

1 Refers to a quarter section or a 451 m radius, with the most likely affected receptors at the centre. For quarter sections with various land uses or with mixed densities, the density chosen must be factored for the area under consideration on a prorated basis.

2 Definition of transportation proximity category as follows:
Category 1—receptor units more than 500 m from heavily travelled roads and rail lines and not subject to frequent aircraft flyovers.
Category 2—receptor units more than 30 m but less than 500 m from heavily travelled roads and rail lines and not subject to frequent aircraft flyovers.
Category 3—receptor units less than 30 m from heavily travelled roads and rail lines and/or subject to frequent aircraft flyovers.

3 ASL is 5 dB below the BSL prescribed in the AUC Rule 012.

3.2 Low Frequency Noise

As part of the NIA requirements in AUC Rule 012, the potential for low-frequency noise (LFN) effects from a project should be considered. LFN is defined as a receptor where a clear tone is present at a frequency between 20 Hz and 250 Hz and the difference between the overall C-weighted sound level and the overall A-weighted sound level is equal to or greater than 20 dB. The presence of both conditions at a receptor indicates the potential for LFN concerns.

3.3 Northeast Capital Industrial Association

NCIA is a not-for-profit cooperative representing industry located in AIH area. NCIA member companies range from chemical and petrochemical industries to industrial service companies.

In 2012, the RNMP developed by NCIA in collaboration with the AUC and AER (previous Energy Resources Conservation Board). The RNMP provides a regional approach for managing environmental noise from industrial activity and is the regional solution for NCIA member companies in AIH to comply with the AER Directive 038 and AUC Rule 012.

The RNM, developed following the RNMP, is an online tool showing typical noise levels in AIH area. To populate the model, member facilities work with noise consultants to develop facility noise models. The noise models are then combined into one regional model to show the noise effects in the region member facilities. The model can predict noise levels up to 5 kilometers from a noise source (i.e., an industrial facility). The accuracy of the model is evaluated each year by conducting 24-hour noise measurements at 13 pre-selected locations in the region. Predicted sound level results from the RNM will be used to quantify the baseline sound levels during an assessment. The latest RNM is presented in the 2024 RNMP Report (NCIA 2024), and reference report “2023 Regional Noise Model Update – Northeast Capital Industrial Association Regional Noise Management Plan”, prepared by SLR Consulting Ltd., May 2024 (SLR 2024).

AUC indicates that the RNMP meets the criteria set out in AUC Rule 012. An applicant can use the RMN to quantify the baseline acoustic environment without the proposed project. If the PSLs are exceeded at nearby receptors due to the baseline acoustic environment, a “no net increase” approach is used to determine whether the noise effect from a proposed project is acceptable, i.e., the noise levels would have no net increase as a result of the proposed project because of the existing baseline sound levels. If there is any net increase, the applicant would need to address how the noise level would be planned to be restored to the initial level in the next short term 3 to 5 year period.

4 Methodology

4.1 Environmental Noise Descriptors

Environmental noise typically varies over time. To account for this variation, a single number descriptor known as the energy equivalent sound level (L_{eq}) is used. It is defined as the steady, continuous sound level over the specified time that has the same acoustic energy as the actual varying sound levels over the same time. The unit for L_{eq} is the A-weighted dBA, which reflects the response of the human ear to different sound frequencies. Time periods commonly used for L_{eq} measurements and regulatory criteria are daytime (07:00 to 22:00) and nighttime (22:00 to 07:00). The daytime L_{eq} is the 15-hour A-weighted L_{eq}. Similarly, the nighttime L_{eq} is a 9-hour A-weighted L_{eq}.

For a summary of acronyms and additional details on commonly used noise terminology, refer to the Glossary.

4.2 Assessment Approach

The NIA assessment considered three cases as follows:

- Baseline Case includes the noise effect from the ASL and other third-party regulated (i.e., AUC or AER) existing energy related facilities, approved but not yet constructed energy-related facilities, and proposed energy-related facilities that have been deemed complete under applications to AUC, these facilities are included in the NCIA RNM assessment.
- Project Case includes noise effect from the Project only.
- Application Case assesses the cumulative noise effect including the contribution from the Baseline Case and the Project Case. The Application Case cumulative sound level results are compared to the PSLs to verify compliance with the AUC Rule 012 requirements.

The approach used to assess the Project noise effects along the LAA boundary during normal operations of the Project is summarized as follows:

1. Determine ASLs and PSLs for receptor location(s) within the LAA.
2. Quantify the Baseline Case sound levels. The prescribed ASL and RNM noise level result will be incorporated in the determination for the Baseline Case sound levels at the noise receptor.
3. Predict the Project Case sound levels representing the noise effect from the Project only.
4. Determine the Application Case sound levels by combining the noise effect from the Baseline Case and Project Case.
5. Assess compliance with the AUC Rule 012 requirements by comparing the Application Case cumulative sound levels at the receptor to the PSL.

4.3 Noise Modelling

Noise predictions were conducted using Cadna/A acoustic modeling software (DataKustik 2025), which utilizes the internationally accepted sound propagation algorithms (ISO 9613-1: 1993, ISO 9613-2: 2024). The modelling parameters used in the assessment are summarized in Table 3.

Table 3 Acoustic Modelling Parameters

Item	Model Parameters	Model Setting
1	Temperature	10°C
2	Relative humidity	70%
3	Wind speed	Downwind condition, as per ISO 9613-2 standard downwind setting (wind speed of 1 to 5 metres per second (m/s)
4	Noise propagation model	CadnaA (DataKustik 2025)
5	Standard	ISO 9613
6	Ground conditions and attenuation factor	Ground absorption (G) of 0.8 (surrounding area) and 0.2 (Project area)
7	Terrain Parameters (terrain resolution)	Ground terrain incorporated at 50 m by 50 m resolution.
9	Reflection parameters	1 order of reflection

Meteorological factors, such as temperature, humidity, wind speed and direction, affect sound propagation. Effects of wind and atmospheric stability on outdoor sound propagation during various weather conditions can cause large variations in Project related sound levels when measured at a receptor location. Upwind sound propagation, or propagation during unstable atmospheric conditions, typically results in lower receptor levels, while downwind conditions and stable atmosphere tends to increase receptor levels. The wind speed is based on ISO 9613-2 standard, which assumes 1 to 5 metres per second (m/s) downwind condition from the source to the receptor in the sound propagation calculation.

The Project is set in an area with dense vegetation and loose soil. Correspondingly, the ground absorption constant G was set to 0.8 (soft, absorptive ground) outside of the Project boundary and 0.2 (hard, gravel) within the Project boundary.

Building structures were included in the model to account for the reflective effects and barrier effects of buildings. One order of reflection is also incorporated in the model.

5 Baseline Case

The Baseline Case sound levels are the combined sound levels of the ASL and the NCIA RNM results for the Project RAA.

5.1 RNM Results

In accordance with the RNMP Report 2024, which covers the 2022 and 2023 calendar years, the RNM noise model represents existing facilities from NCIA member companies and proposed facilities that have already been approved by AER or AUC but are not yet constructed. Two cases of modeling scenarios are presented:

- Case 1: Existing Case
  - Includes submitted sound models of existing facilities of NCIA member companies.
  - Includes sound models of existing non-member facilities voluntarily submitted or from the data collected as part of other studies shared with NCIA.
- Case 2: Future Case
  - Includes all facilities from Case 1.
  - Includes proposed facilities expected to be constructed within 1-5 years.

According to AUC Rule 012, the Baseline Case should include existing energy-related facilities, approved but not yet constructed energy-related facilities, and proposed energy-related facilities that have been deemed complete under applications to AUC. In a conservative approach, Case 2: Future Case of the RNM is used to determine the noise contributions from the existing energy-related facilities, approved and proposed energy-related facilities in the AIH-DIZ area.

The latest 2023 RNM model noise contours are available as CadnaA® “gridmap” for NCIA members, and the model results represent the concept of “downwind in all directions” in the noise model based upon noise propagation standard ISO 9613-2:1996.

Stantec obtained the “gridmap” from NCIA on behalf of GECGP. The “gridmap” results of RNM Case 2 are imported into the CadnaA noise model to determine the sound levels at the receptors within the assessment area. The predicted daytime and nighttime sound levels at receptor R1 are presented in Table 4. Figure 2 shows the noise contour results from the RNM.

Table 4 NCIA RNM Results

Receptor ID	Daytime Sound Level (dBA)	Nighttime Sound Level (dBA)
R1	33.9	33.9

5.2 Baseline Case Results

The Baseline Case sound levels are the combined sound levels of the ASL and NCIA RNM results. Table 5 summarizes the results at R1. The results show that Baseline Case sound levels at the receptor are below the PSLs.

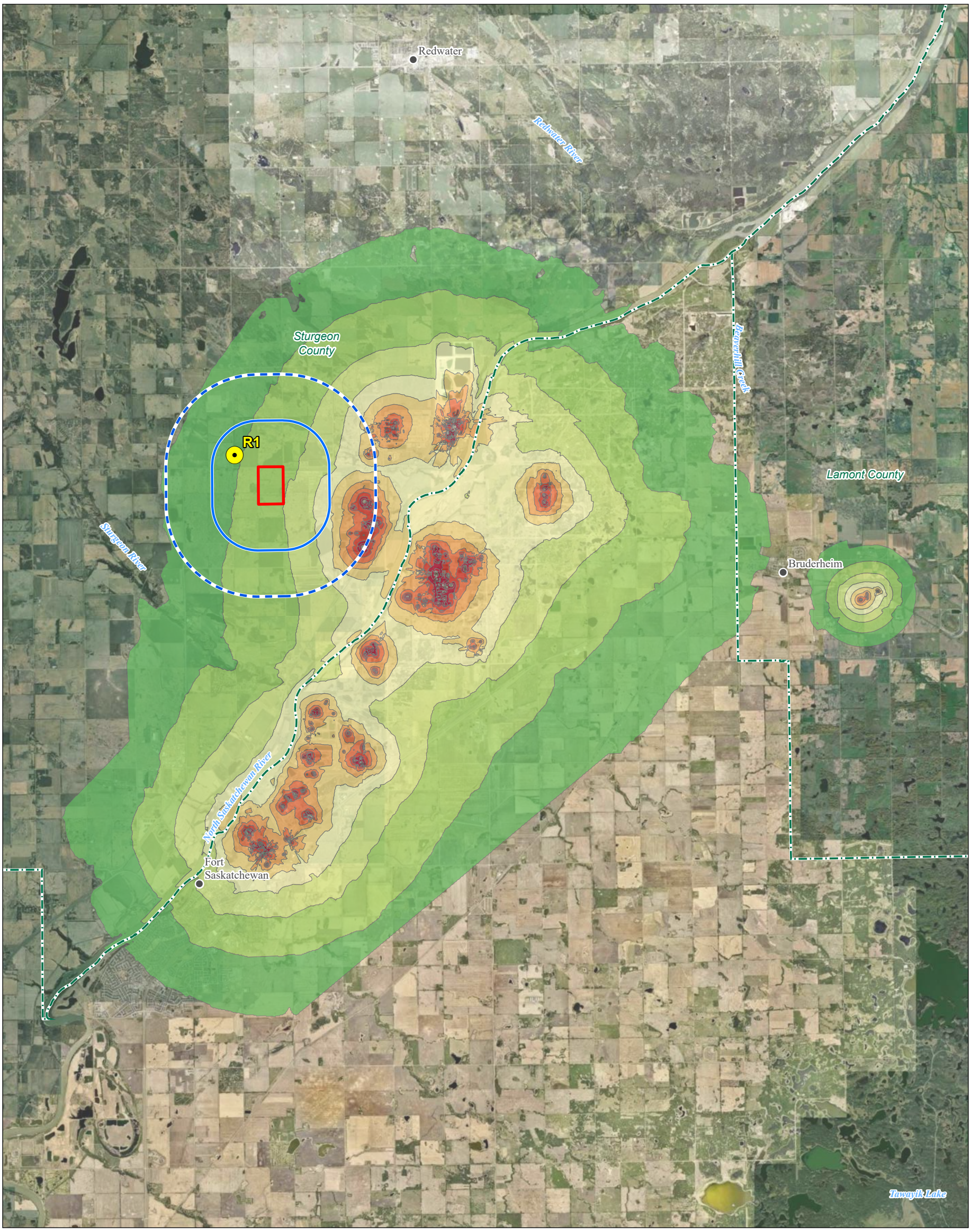
Table 5 Baseline Case Results

Receptor ID	Ambient Sound Level (dBA)[1]		NCIA RNM Results (dBA)		Baseline Case Sound Level [2] (dBA)		PSL (dBA)	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	50	40	33.9	33.9	50.1	41.0	55	45

Notes:

[1] Ambient Sound Level (ASL) values from Table 2.

[2] Logarithmic additions of ASL and RNM results.



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

Noise Level (dBA)
- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- >70

- Receptor
- Project Development Area
- Local Assessment Area (1.5km)
- Regional Assessment Area
- Populated Centre

0 2.5 5
kilometres

(At original document size of 11x17) 1:130,000

N

Stantec

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

Prepared by NF on 2025-06-26

Client/Project
Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP.
Greenlight Electricity Centre Project
Noise Impact Assessment

123514064-0001

Figure No.
2

Title

RNM Noise Contours

6 Project Case

The Project Case considers noise effect from the continuous normal operation of the Project.
The following sections discuss noise emission assessment and mitigation requirements for operation phase as required by AUC Rule 012.

6.1 Noise Emission Sources

The Project case considers noise from the continuous operation of the Project sources only. The Project includes indoor and outdoor noise sources. The following sections present the noise emission sources and modelling results for the Project.

The Project consists of four 1x1 combined cycle gas turbine driven generator units, with four air cooled condensers (ACC). The Project was modelled using the following major pieces equipment and their associated ancillary systems:

- Four Siemens SGT6-8000H gas turbine (GT) generators
- Four Siemens SST steam turbine (ST) generators
- Four heat recovery steam generators (HRSGs)
- Four ACC and steam ducts
- Four boiler feed water pump (BFWP) packages
- Four auxiliary boilers
- Four generator step-up (GSU) transformers
- Four generator auxiliary transformers
- Other ancillary equipment

Major equipment such as the gas turbine generators and steam turbine generators will be located inside the buildings. Other equipment such as the HRSGs, ACC, steam ducts, BFWPs, and auxiliary boilers will be located outdoors.

The sound power levels for operating equipment sources were determined based on the equipment noise datasheets from the manufacturers, and noise database for similar equipment. In addition, the manufacturer provided sound power levels for the power train equipment, including GT units, ST units and HRSGs.

The following sections present the indoor and outdoor noise sources included in the noise model.

6.1.1 Indoor Noise Sources

Table 6 summarizes the sound power level of noise sources inside buildings. GECGP provided equipment plot plan used to identify equipment that will be enclosed in buildings. Sound power levels in octave band center frequencies are presented in Appendix B.

The equipment sound power levels within each building were used to calculate noise propagation through the building walls, roofs and ventilation elements to the outside. The prediction approach was based on room acoustics calculation from acoustic literature. Noise radiating through the building walls and roof was modelled as an area sources.

Table 6 Building Source Sound Power Levels

Building	Noise Source	Quantity[a]	Sound Power Level (dBA)[b]	Reference[c]
Generation Building (Housing GT and ST)	Gas Turbine Enclosure	4	91	1
	GT Exhaust Diffuser	4	110	1
	GT Lube Oil Package	4	106	1
	GT Generator	4	118	1
	Steam Turbine	4	113	1
	Steam Turbine Generator	4	96	1
	STG Vacuum Pump	4	104	2

Notes:

[a] Non-operating spares not included in listed quantities

[b] Sound Power level per unit or individual piece of equipment

[c] 1 – Sound power level based on manufacturer provided information
2 – Representative value based on similar equipment

6.1.2 Outdoor Noise Sources

Outdoor noise-emitting equipment associated with the Project, and corresponding sound power levels are summarized in Table 7. Sound power levels in octave band center frequencies are presented in Appendix B.

Table 7 Outdoor Source Sound Power Levels

Source Name	Qty	Sound Power Level (dBA)[a]	Reference[b]
HRSG Stack Exit (with 90-degree directivity)	4	94	1
HRSG Stack Casing	4	83	1
HRSG Body	4	97	1

Source Name	Qty	Sound Power Level (dBA)[a]	Reference[b]
HRSG Transition Duct	4	101	1
HRSG Duct Burner	4	110	1
GT Combustion Air Inlet Filter House Intake	4	92	1
GT Combustion Air Inlet Filter House Duct	4	101	1
GT Enclosure Ventilation Outlet	4	102	1
GT Enclosure Ventilation Inlet	4	102	1
ACC Steam Duct	4	102	3
ACC Intake	4	106	1
ACC Outlet	4	106	1
GT GSU Transformer	4	104	3
GT Auxiliary Transformer	4	96	3
Fuel Gas Yard Piping	3	93	3
SCR Skid	4	102	3
Generation Building Roof	4	86	2
Generation Building Walls	4	89	2
Generation Building Exhaust	4x19	91	2
Generation Building Intake	4x19	90	2
Generation Building Rollup Door	4	79	2
BFWP (one operating and one standby)	4	110	3
Auxiliary Boiler	4	97	3

Notes:

[a] Sound Power level per unit or individual piece of equipment

[b] 1 – Sound power level based on manufacturer provided information
2 – Calculated value based on acoustic literature
3 – Representative value based on similar equipment

6.2 Mitigation Measures

The Project includes mitigation measures that are inherent in the designs such as buildings and enclosures for the turbines and combustion air inlet and exhaust silencers. This NIA assumes that the acoustic performance of the Project equipment components will meet the values specified in Table 6 and Table 7. Addition mitigation measures are not required to meet the PSLs of AUC Rule 012.

6.3 Assumptions and Conditions

The following assumptions or conditions were included in the assessment:

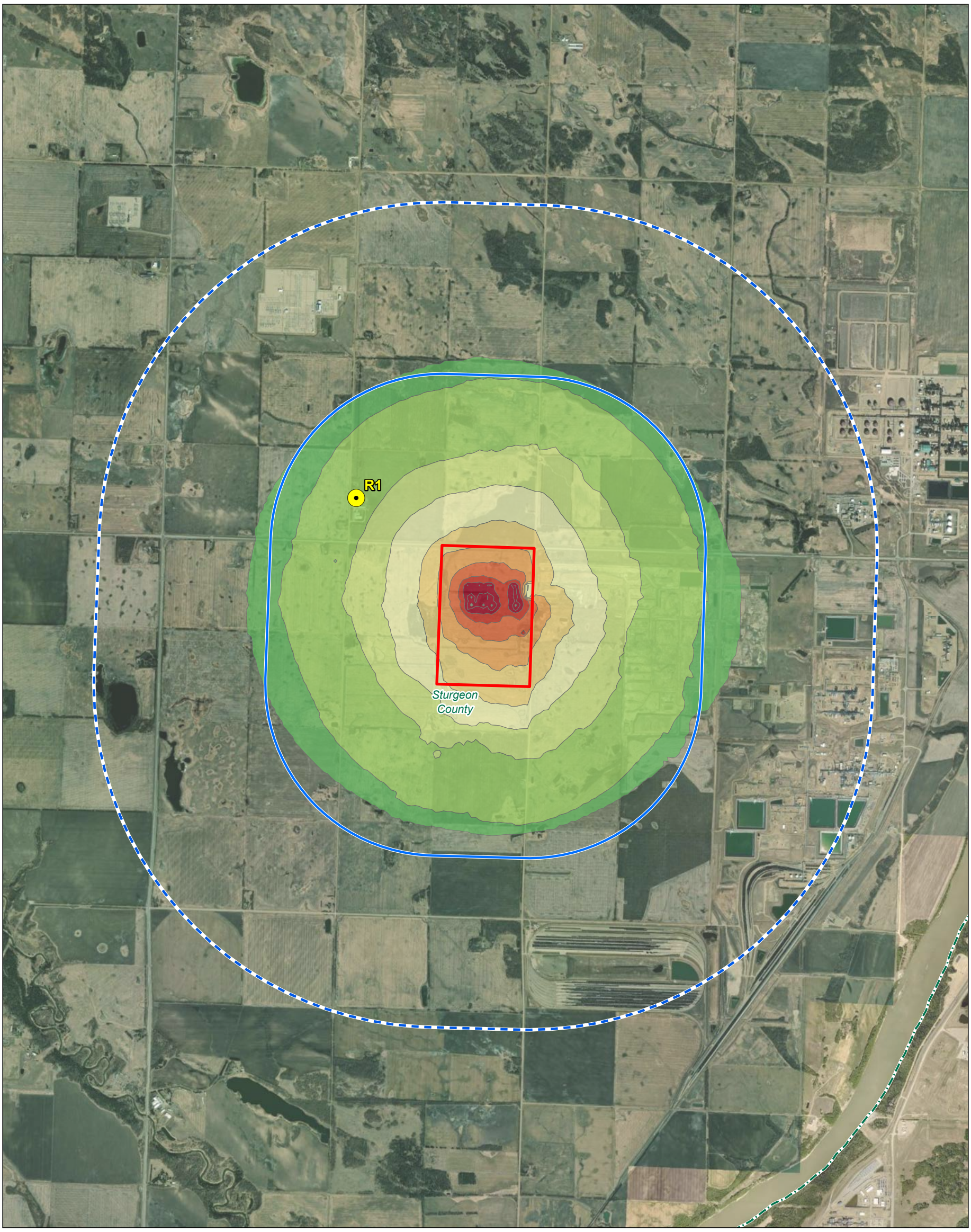
- Plot plan and equipment layout based on the information and drawings provided for current design (Project drawing Title “KAM-GEC001-G100-001A Rev A”, dated June 16, 2025).
- Equipment acoustic performances in Table 6 and Table 7 are achievable by the manufacturer or equipment supplier.
- All equipment is continuously operating at 100% capacity.
- All building doors and windows are closed when equipment is operating.
- Pre-engineered building wall and roof panel configurations are designed to achieve sound transmission class (STC) rating of 30 or higher.
- The building rollup doors are designed to achieve STC rating of 24 or higher.

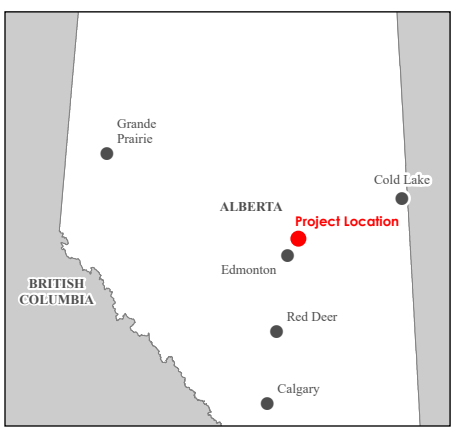
6.4 Project Case Results

Table 8 summarizes the predicted Project Case sound levels at R1. Figure 3 presents the Project Case noise contours within the RAA. The model assumes all equipment is operating continuously during both the daytime and nighttime periods. Therefore, prediction results are the same for both periods.

Table 8 Project Case Sound Levels

Receptor ID	Project Case Sound Level (dBA)	
	Daytime	Nighttime
R1	38.3	38.3





Noise Level (dBA)

- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- 55 to 60
- 60 to 65
- 65 to 70
- >70

- Receptor
- Project Development Area
- Local Assessment Area (1.5km)
- Regional Assessment Area (3km)

0 1 2
kilometres

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

N

Stantec

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Data Sources: Base - Governments of Canada and Alberta; Thematic - Kineticor
3. Imagery: Strathcona County, Earthstar Geographics

Project Location — Prepared by WH on 2025-08-18
NE ¼ and SE ¼ 10-056-22 W4M, Alberta

Client/Project — 123514064-0001
Greenlight Electricity Centre GP Ltd., on behalf of Greenlight Electricity Centre LP.
Greenlight Electricity Centre Project
Noise Impact Assessment

Figure No.
3

Title

Greenlight Noise Contours

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6.5 Low Frequency Noise Analysis

AUC Rule 012 assesses LFN by the presence of a clear tone between 20 Hz and 250 Hz, and where the difference between the overall C-weighted sound level and the overall A-weighted sound level is equal to, or greater than 20 dB. The presence of both conditions at a receptor indicates the potential for LFN concerns. The ASL and third-party facility noise contributions are not included in the LFN analysis.

A presence of tones below 250 Hz are commonly identified from post-construction field noise measurements rather than during the design stage because equipment noise emission data in one-third octave bands (needed for identifying tones) is typically not available from the manufacturers. Sound generated by modern combined cycle power plants does not generally have low frequency tonal components unless there is a deficiency in the aerodynamic design of some component equipment.

Table 9 presents the predicted A-weighted and C-weighted sound levels at R1. Results in Table 9 show that the dBC minus dBA values are below 20 decibels (dB) at R1. Therefore, this assessment concludes that there is low potential for LFN effect at the residential receptor R1.

Table 9 Low Frequency Noise Analysis

Receptor ID	Predicted Daytime and Nighttime Project Only Sound Level		dBC minus dBA (dB)	Equal to or Greater than 20 dB?
	A-Weighted (dBA)	C-Weighted (dBC)		
R1	38.3	57.8	19.5	No

7 Application Case

The Application Case determines the cumulative sound levels by combining the Baseline Case (i.e., ASL and NCIA RNM results) and Project Case sound levels together. These results are compared to the PSLs to verify the Project's status of compliance.

Table 10 summarizes the cumulative sound levels at R1. The results indicate that the cumulative sound levels are below the PSLs at R1. Therefore, the Project complies with the AUC Rule 012 requirements.

Table 10 Application Case Results

Receptor	Project Case Sound Level (dBA)		Baseline Case Sound Level (dBA)		Cumulative Sound Level[1] (dBA)		Permissible Sound Level (dBA)		Below PSLs?
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime	
R1	38.3	38.3	50.1	41.0	50.4	42.9	55	45	Yes

Note:

[1] Logarithmic addition of Project Case and Baseline Case.

8 Conclusion

Noise effects from the Project were assessed at the receptor R1 located 860 m from the Project boundary. The Permissible Sound Levels for R1 were determined according to the AUC Rule 012 requirements. Baseline Case sound levels at the receptor were determined using the prescribed ASL and NCIA RNM results. Noise emission levels were compiled using manufacturers data, owner's engineering specifications and drawings, and representative noise emission levels from similar equipment and input into an acoustic model.

The modeling results indicate that the predicted cumulative sound levels are below the daytime and nighttime PSLs at R1. Also, based on AUC Rule 012 prescribed approach, low frequency noise effect is not expected at R1. This NIA concludes that the Project complies with the AUC Rule 012 requirements.

9 Acoustic Practitioners Information

Table 11 Practitioners Information

Name	**Yong Ma, P.Eng**	**Jonathan Chui, P.Eng, INCE**
Title	Senior Acoustic Engineer	Senior Noise Specialist
Role	• Discipline lead • Noise emission and modelling • NIA report author	• Quality Review
Training and experience	• Over 24 years of experience in acoustic consulting • Member of the Association of Professional Engineers and Geoscientists of Alberta (APEGA)	• Over 22 years of experience in acoustic consulting • Member of the Association of Professional Engineers and Geoscientists of Alberta (APEGA) and a member of the Institute of Noise Control Engineers of the USA (INCE)

10 References

AUC (Alberta Utilities Commission). 2024. Rule 012, Noise Control, version September 30, 2024 – present. Alberta, Canada.

DataKustik. 2025. DataKustik GmbH Cadna/A Computer Aided Noise Abatement (CadnaA) Model, Version 2025 (build:209.5501), Munich, Germany.

ISO (International Organization for Standardization). 1993. International Standard ISO 9613-1, ISO 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors. Part 1: Calculation of Absorption of Sound by the Atmosphere. Geneva, Switzerland.

ISO. 1996. International Standard ISO 9613-1, ISO 9613-2, Acoustics – Attenuation of sound during propagation outdoors. Part 2: General Method of Calculation. Geneva, Switzerland.

NCIA (Northeast Capital Industrial Association). 2024. NCIA Regional Noise Management Plan (RNMP) Report (covering the 2022 and 2023 Calendar Years). Prepared for the Albert Energy Regulator (AER) and the Alberta Utilities Commission (AUC), May 2024.

SLR 2024. 2023 Regional Noise Model Update - Northeast Capital Industrial Association Regional Noise Management Plan. Prepared for Northeast Capital Industrial Association. SLR Consulting (Canada) Ltd., May15, 2024.

Appendices

Appendix A Alberta Transportation Traffic Volume

Reference Number: 997281

Intersection of: 643 & RGE RD 222 BOYSDALE RD

North On: RGE RD 222

Vehicle Type	Volume	%
A: Passenger Vehicle	0	-
B: Recreational Vehicle	0	-
C: Bus	0	-
D: Single Unit Truck	0	-
E: Tractor Trailer Unit	0	-
AADT	**40**	
ASDT	30	

2024 AADT / ASDT Estimates

Leg AADT Volumes

40 / 4,460 / 4,660 / 220

Total Entering Volume: **4,670**

From North

	Right	Thru	Left
	0	**0**	**0**
A	0	0	0
B	0	0	0
C	0	0	0
D	0	0	0
E	0	0	0

To North

	30
A	0
B	0
C	0
D	0
E	0

To West

	2,190
A	1,978
B	4
C	0
D	66
E	142

From East

	Left	Thru	Right
	120	**2,190**	**0**
A	118	1,978	0
B	0	4	0
C	0	0	0
D	1	66	0
E	1	142	0

West On: 643

Vehicle Type	Volume	%
A	4,043	90.7%
B	6	0.1%
C	0	0.0%
D	129	2.9%
E	282	6.3%
AADT	**4,460**	
ASDT	5,010	

East On: 643

Vehicle Type		
A	4,235	90.9%
B	6	0.1%
C	0	0.0%
D	135	2.9%
E	284	6.1%
AADT	**4,660**	
ASDT	5,220	

From West

	Left	Thru	Right
	0	**2,260**	**10**
A	0	2,056	9
B	0	2	0
C	0	0	0
D	0	62	1
E	0	140	0

To East

	2,350
A	2,139
B	2
C	0
D	68
E	141

To South

	130
A	127
B	0
C	0
D	2
E	1

From South

	Left	Thru	Right
	0	**0**	**90**
A	0	0	83
B	0	0	0
C	0	0	0
D	0	0	6
E	0	0	1

South On: RGE RD 222

Vehicle Type	Volume	%
A: Passenger Vehicle	210	95.5%
B: Recreational Vehicle	0	0.0%
C: Bus	0	0.0%
D: Single Unit Truck	8	3.6%
E: Tractor Trailer Unit	2	0.9%
AADT	**220**	
ASDT	260	

ABBREVIATIONS:

AADT: Annual Average Daily Traffic. Average daily traffic expressed as vehicles per day for the period from January 1 to December 31 (inclusive), 365 days.

ASDT: Average Summer Daily Traffic. Average daily traffic expressed as vehicles per day for the period from May 1 to September 30 (inclusive), 153 days.

NOTE:
Coloured line thickness corresponds to turning movement volume.

Reference Number:
997281

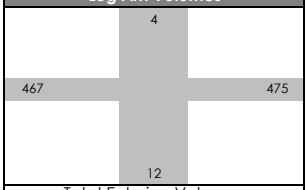
Intersection of:
643 & RGE RD 222 BOYSDALE RD

North On: RGE RD 222

Vehicle Type	Volume	%
A: Passenger Vehicle	4	100.0%
B: Recreational Vehicle	0	0.0%
C: Bus	0	0.0%
D: Single Unit Truck	0	0.0%
E: Tractor Trailer Unit	0	0.0%
AM	**4**	

2024 AM 100th Highest Hour Estimates

Leg AM Volumes



Total Entering Volume:
479

From North

	Right	Thru	Left
	0	**0**	**0**
A	0	0	0
B	0	0	0
C	0	0	0
D	0	0	0
E	0	0	0

To North

	4
A	4
B	0
C	0
D	0
E	0

To West

	47
A	39
B	0
C	0
D	0
E	8

From East

Left	Thru	Right	
0	**47**	**0**	
0	39	0	A
0	0	0	B
0	0	0	C
0	0	0	D
0	8	0	E

West On: 643

	Volume	%
A	443	94.9%
B	0	0.0%
C	0	0.0%
D	8	1.7%
E	16	3.4%
AM	**467**	

Vehicle Type

	Volume	%
A	451	94.9%
B	0	0.0%
C	0	0.0%
D	8	1.7%
E	16	3.4%
AM	**475**	

East On: 643

From West

Left	Thru	Right	
0	**420**	**0**	
0	404	0	A
0	0	0	B
0	0	0	C
0	8	0	D
0	8	0	E

To East

	428
412	A
0	B
0	C
8	D
8	E

To South

	0
A	0
B	0
C	0
D	0
E	0

From South

Left	Thru	Right	
0	**4**	**8**	
0	4	8	A
0	0	0	B
0	0	0	C
0	0	0	D
0	0	0	E

South On: RGE RD 222

Vehicle Type	Volume	%
A: Passenger Vehicle	12	100.0%
B: Recreational Vehicle	0	0.0%
C: Bus	0	0.0%
D: Single Unit Truck	0	0.0%
E: Tractor Trailer Unit	0	0.0%
AM	**12**	

NOTE:
Coloured line thickness corresponds to turning movement volume.

Reference Number:
997281

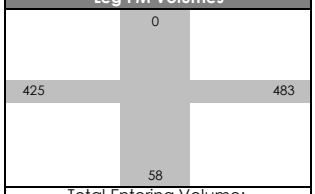
Intersection of:
643 & RGE RD 222 BOYSDALE RD

North On: RGE RD 222

Vehicle Type	Volume	%
A: Passenger Vehicle	0	-
B: Recreational Vehicle	0	-
C: Bus	0	-
D: Single Unit Truck	0	-
E: Tractor Trailer Unit	0	-
PM	0	

2024 PM 100th Highest Hour Estimates

Leg PM Volumes



Total Entering Volume:
483

From North

	Right	Thru	Left
	0	**0**	**0**
A	0	0	0
B	0	0	0
C	0	0	0
D	0	0	0
E	0	0	0

To North

	0
A	0
B	0
C	0
D	0
E	0

To West

	383
A	378
B	0
C	0
D	0
E	5

From East

	Left	Thru	Right	
	56	**383**	**0**	
A	56	378	0	A
B	0	0	0	B
C	0	0	0	C
D	0	0	0	D
E	0	5	0	E

439

West On: 643

	Volume	%
A	420	98.8%
B	0	0.0%
C	0	0.0%
D	0	0.0%
E	5	1.2%
PM	425	

East On: 643

Vehicle Type		
A	478	99.0%
B	0	0.0%
C	0	0.0%
D	0	0.0%
E	5	1.0%
PM	483	

From West

	Left	Thru	Right
	0	**42**	**0**
A	0	42	0
B	0	0	0
C	0	0	0
D	0	0	0
E	0	0	0

42

To East

	44
A	44
B	0
C	0
D	0
E	0

To South

	56
A	56
B	0
C	0
D	0
E	0

From South

	Left	Thru	Right
	0	**0**	**2**
A	0	0	2
B	0	0	0
C	0	0	0
D	0	0	0
E	0	0	0

2

South On: RGE RD 222

Vehicle Type	Volume	%
A: Passenger Vehicle	58	100.0%
B: Recreational Vehicle	0	0.0%
C: Bus	0	0.0%
D: Single Unit Truck	0	0.0%
E: Tractor Trailer Unit	0	0.0%
PM	58	

NOTE:
Coloured line thickness corresponds to turning movement volume.

Appendix B Sound Power Levels

Table B.1 Source Sound Power Levels (dB re 1pW)

Source Name	PWL (dB) in Octave Band Center Frequency (Hz) per Unit									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
HRSG Stack Exit (with 90-degree directivity)	111	107	104	94	95	79	70	71	73	94
HRSG Stack Casing	103	104	88	79	76	79	56	46	20	83
HRSG Body	114	118	102	97	92	89	86	82	61	97
HRSG Transition Duct	111	110	102	95	95	96	93	92	71	101
HRSG Duct Burner	108	114	116	108	98	100	104	105	102	110
GT Exhaust Diffuser	129	126	111	109	106	104	102	96	73	110
GT Combustion Air Inlet Filter House Intake	116	106	97	82	72	88	69	75	90	92
GT Combustion Air Inlet Filter House Duct	109	104	103	92	86	100	85	86	91	101
GT Enclosure Ventilation Outlet	89	98	93	92	89	94	99	91	86	102
GT Enclosure Ventilation Inlet	89	98	93	93	90	93	98	91	87	102
ACC Steam Duct	101	103	96	91	87	84	100	81	70	102
ACC Intake	110	109	110	106	103	101	97	90	84	106
ACC Outlet	110	109	110	106	103	101	97	90	84	106
GT GSU Transformer	103	106	108	103	103	97	92	87	80	104
GT Aux Transformer	93	99	101	96	96	90	85	80	73	96
Fuel Gas Yard Piping	93	95	92	84	83	87	80	88	87	93
SCR Skid	96	103	99	96	97	97	95	92	87	102
Generation Building Roof	113	106	96	82	76	81	74	67	61	86
Generation Building Walls	116	109	99	85	79	84	77	70	64	89
Generation Building Exhaust	102	100	93	87	85	82	84	86	81	91

Source Name	PWL (dB) in Octave Band Center Frequency (Hz) per Unit									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
Generation Building Intake	95	94	86	83	83	83	84	82	79	90
Generation Building Rollup Door	100	93	91	82	74	67	64	61	52	79
Boiler Feed Water Pump	100	102	101	98	98	106	104	104	93	110
Auxiliary Boiler	98	100	99	97	94	91	88	85	82	97
Gas Turbine Enclosure	98	101	86	81	77	82	83	86	82	91
GT Lube Oil Package	110	110	102	105	12	101	98	98	94	106
GT Generator	117	123	120	112	113	109	113	111	108	118
Steam Turbine	117	115	116	111	110	105	106	106	100	113
Steam Turbine Generator	102	114	107	96	89	88	86	82	65	96
STG Vacuum Pump	107	107	103	100	100	98	97	96	89	104
Service Water Pump	75	81	79	83	89	89	87	75	71	93
Demineralized Water Pump	75	81	79	83	89	89	87	75	71	93
Air Compressor	83	79	84	83	81	84	89	86	79	93

Appendix H HRA Approval

Alberta

HRA Number: 4940-25-0046-001
July 10, 2025

Historical Resources Act Approval with Conditions

Proponent: Greenlight Electricity Centre Limited Partnership
Kineticor Asset Management, 1410, 715 - 5th Avenue SW, Calgary, AB T2P 2X6
Contact: Mr. Rob Thomas

Agent: Stantec
Contact: Murray Lobb

Project Name: **Greenlight Electricity Centre Project**

Project Components: Power Plant
Substation (new)
Access Road
Temporary Workspace
Other - See Additional Comments

Application Purpose: Requesting HRA Approval / Requirements

Historical Resources Act approval is granted for the activities described in this application and its attached plan(s)/sketch(es) subject to the following conditions.

David Link
Assistant Deputy Minister
Heritage Division
Alberta Arts, Culture and Status of Women

SCHEDULE OF CONDITIONS

ARCHAEOLOGICAL RESOURCES

Historical Resources Act approval is granted in relation to archaeological resources, subject to the conditions outlined below.

1. *Historical Resources Act* approval is granted conditionally on the understanding that final development plans will be submitted for review by Alberta Arts, Culture and Status of Women before approval to proceed with construction is granted. The final plans must be submitted in a new Historic Resources Application prior to the onset of development activities. The application must be accompanied by GIS shapefiles.

SCHEDULE OF CONDITIONS (continued)

PALAEONTOLOGICAL RESOURCES

There are no *Historical Resources Act* requirements associated with palaeontological resources; however, the proponent must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

INDIGENOUS TRADITIONAL USE SITES

There are no *Historical Resources Act* requirements associated with Indigenous traditional use sites of a historic resource nature; however, the proponent must comply with Standard Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

HISTORIC STRUCTURES

There are no *Historical Resources Act* requirements associated with historic structures; however, the proponent must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

PROVINCIALLY DESIGNATED HISTORIC RESOURCES

There are no *Historical Resources Act* requirements associated with Provincially Designated Historic Resources; however, the proponent must comply with Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources, which are applicable to all land surface disturbance activities in the Province.

Proposed Development Location:

MER	RGE	TWP	SEC	LSD List
4	22	56	10	1-2,7-10,15-16

Documents Attached:

Document Name	Document Type
Conceptual Layout	Illustrative Material
topographic map (reduced file size)	Miscellaneous

Appendix I ACO Determination

Aboriginal Consultation Office Digital Service

FNC202355355

23-00149 Greenlight Electricity Centre

Proponent 1031465001 - GREENLIGHT ELECTRICITY CENTRE GP LTD

Pre-Consultation Assessment

✓ **Application**	September 27, 2023
✓ **Recommendation**	October 5, 2023
ACO Reviewer	Amanda Brady
Phone	(403) 592-3067
Email	amanda.brady@gov.ab.ca
Proponent	Sarah Swiekatun
Phone	(403) 327-9585
Email	sswiekatun@edwardsland.ca

Adequacy Assessment

Application	—
Recommendation	—
ACO Reviewer	—
Phone	—
Email	—
Proponent	—
Phone	—
Email	—

Project information

Project buffer

No, this project does not have a buffer.

Buffer description

N/A

Project duration

Project duration is expected to be 30 years.

Construction duration

Construction duration is expected to be 5 years.

Project description and supporting information

Assessment request for a 1400-megawatt (MW) combined cycle power generation facility on private land with carbon capture. ACO confirmed no assessment required under Public Lands. Further approval will be obtained by AUC. Preliminary lists of Indigenous groups to notify has already been received from Alberta Utility Commission (AUC) and Impact Assessment Agency of Canada (IAAC) (LAIRT also assessed). The AUC's consultation buffer is 2km, however client assessed impacted bands up to 50km radius. 18 FN & Metis Settlements/Community Associations were identified in total. Alexander No. 40 & Enoch Cree No. 135 reserves fall just within the 50km radius.
No HRV values on the impacted project lands, but HRV 5a directly to the east.
Area listed on submission is total of enviro assessment. Phase II assessment is also available if needed.

Pre-Consultation Assessment Recommendation

1 Project Activities

Activity	Regulator	Disposition	Purpose	Consultation Recommended?
001	EPA	EPC	Environmental Protection and Enhancement Act	No

Area	ATS From	ATS To	Amended Site	Communities to be consulted
98 ha	NE - 10 - 56 - 22 - W4	SE - 10 - 56 - 22 - W4	No	

Amendment/Renewal description

—

EPEA activity description

1400-megawatt (MW) combined cycle power generation facility with carbon capture. The facility will utilize modern, highly efficient industrial turbines fueled by gas and captures waste heat to make steam which generates additional electricity via a steam turbine. Carbon capture will be integrated into the facility and infrastructure will be in place at the site to accommodate carbon sequestration.

Activity Duration

30 Years

EPEA Start Date

January 1, 2025

Notes

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