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Moraine Power Generation Project
Impact Assessment Agency of Canada
Detailed Project Description

September 2023

Prepared for:
Impact Assessment Agency of Canada

Prepared by:
Stantec Consulting Ltd.

Project Number:
110220760

Limitations and Sign-off

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Signature

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Vice President,
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Acronyms / Abbreviations

µg	microgram
µg/m^3	micrograms per cubic metre
AAAQO/G	Alberta Ambient Air Quality Objectives/Guidelines
AB	Alberta
AC	Alberta Ministry of Culture (formerly Alberta Culture and Status of Women [ACSW])
ACC	air-cooled condenser
ACHE	air-cooled heat exchanger
ACIMS	Alberta Conservation Information Management System
ACO	Aboriginal Consultation Office
AENV	Alberta Environment
AEP	Alberta Environment and Parks
AEPA	Alberta Ministry of Environment and Protected Areas (formerly Alberta Environment and Parks [AEP])
AER	Alberta Energy Regulator
AESO	Alberta Electric System Operator
AIES	Alberta Interconnected Electric System
ANC	Alberta Newsprint Company
ANSN	Alexis Nakota Sioux Nation
AQHI	Air Quality Health Index
AQM	Alberta Greenhouse Gas Quantification Methodologies
AQMG	Air Quality Model Guideline
AR5	IPCC Fifth Assessment Report
ARU	autonomous recording unit

AUC	Alberta Utilities Commission
BOP	balance of plant
BSL	Basic Sound Level
C&R	conservation and reclamation
CAAQS	Canada Ambient Air Quality Standards
CCGT	Combined Cycle Gas Turbine
CCS	carbon capture and storage
CFB	Canadian Forces base
CH_4	methane
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
cm	centimetre
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COP	Code of Practice
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DCC	Direct Contact Cooler
DFO	Fisheries and Oceans Canada
DPD	Detailed Project Description
ECCC	Environmental and Climate Change Canada
ECCC	Ecological Communities of Management Concern
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency

EPEA	*Environmental Protection and Enhancement Act*
EPP	Environmental Protection Plan
ESRD	Alberta Sustainable Resources and Development
FERMR	Final Essential Requirements of Mandatory Reporting
FRL	Fish Research Licence
ft	foot
FWIMT	Fish and Wildlife Information Mapping Tool
GJ/d	gigajoules per day
GOA	Government of Alberta
GOC	Government of Canada
gpm	gallons per minute
GSU	generator step-up
GT	gas turbine
GTG	gas turbine generator
GWh	gigawatt hour
GWP	Global Warming Potential
H_2O	water vapour
H_2S	hydrogen sulfide
ha	hectare
HADD	harmful alteration, disruption or destruction
HDD	horizontal directional drilling
hr	hour
HRA	*Historical Resources Act*
HRIA	Historic Resources Impact Assessment
HRSG	heat recovery steam generator

HRV	historic resource value
IA	impact assessment
IAA	*Impact Assessment Act*
IAAC	Impact Assessment Agency of Canada or the Agency
ICCF	Integrated CO_2 Capture Facility
ID	induced draft
IGO	intergovernmental organizations
IPCC	Intergovernmental Panel on Climate Change
IPD	Initial Project Description
ISO	Independent System Operator
kg/MWh	kilogram per megawatt hour
kg CO_2e/MWh	kilogram carbon dioxide equivalent per megawatt hour
km	kilometre
km^2	square kilometre
kV	kilovolt
KWBZ	key wildlife biodiversity zone
L/s	litres per second
LAIRT	Landscape Analysis Indigenous Relations Tool
LEG	Low-Emitting Generation
L_{eq}	Equivalent Continuous Sound Pressure Level
LGA	local geographic area
LSD	legal subdivision
L/s	litres per second
L/s/ha	liters per second per hectare
m	metre

m^3	cubic metre
m^3/day	cubic metres per day
MIL	Moraine Initiatives Limited
mm	millimetre
MSSC	Master Schedule of Standards and Conditions
Mt	megatonne
MW	megawatt
N_2	nitrogen
N_2O	nitrous oxides
NGTL	Nova Gas Transmission Ltd.
NH_3	ammonia
NIA	noise impact assessment
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
NPV	net present value
NWL	Normal Water Level
OEM	original equipment manufacturer
PAH	polyaromatic hydrocarbon
PCCC	post-combustion carbon dioxide capture
PGF	Power Generation Facility
PIP	Project Information Package
Pipeline Route	natural gas pipeline route and CO_2 pipeline route
plots	100 m survey point-count radii
PM	particulate matter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter

PM_{10}	particulate matter 10 microns or less in diameter
ppm	parts per million
PSL	permissible sound level
RAP	restricted activity period
ROW	right of way
RV Park	Eagle River Tourism RV Park
RWDI	RWDI Air Inc.
SARA	*Species at Risk Act*
SCR	selective catalytic reduction
SO_2	sulfur dioxide
SOI	Summary of Issues List
SOMC	Species of Management Concern
ST	steam turbine
STG	steam turbine generator
SWMF	stormwater management facility
TBD	to be determined
TDS	total dissolved solids
the Agency	Impact Assessment Agency of Canada
the Project	Moraine Power Generation Project
TIER	Technology Innovation and Emissions Reduction Regulation
TLU	traditional land use
TSP	total suspended particulate
US gpm	United States gallons per minute
VOC	volatile organic compound
W5M	west of the fifth meridian

WAIF	Wetland Assessment and Impact Form
WAIR	Wetland Assessment Impact Report
WCAS	West Central Airshed Society
WCI	Western Climate Initiative

Part A: General Information

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

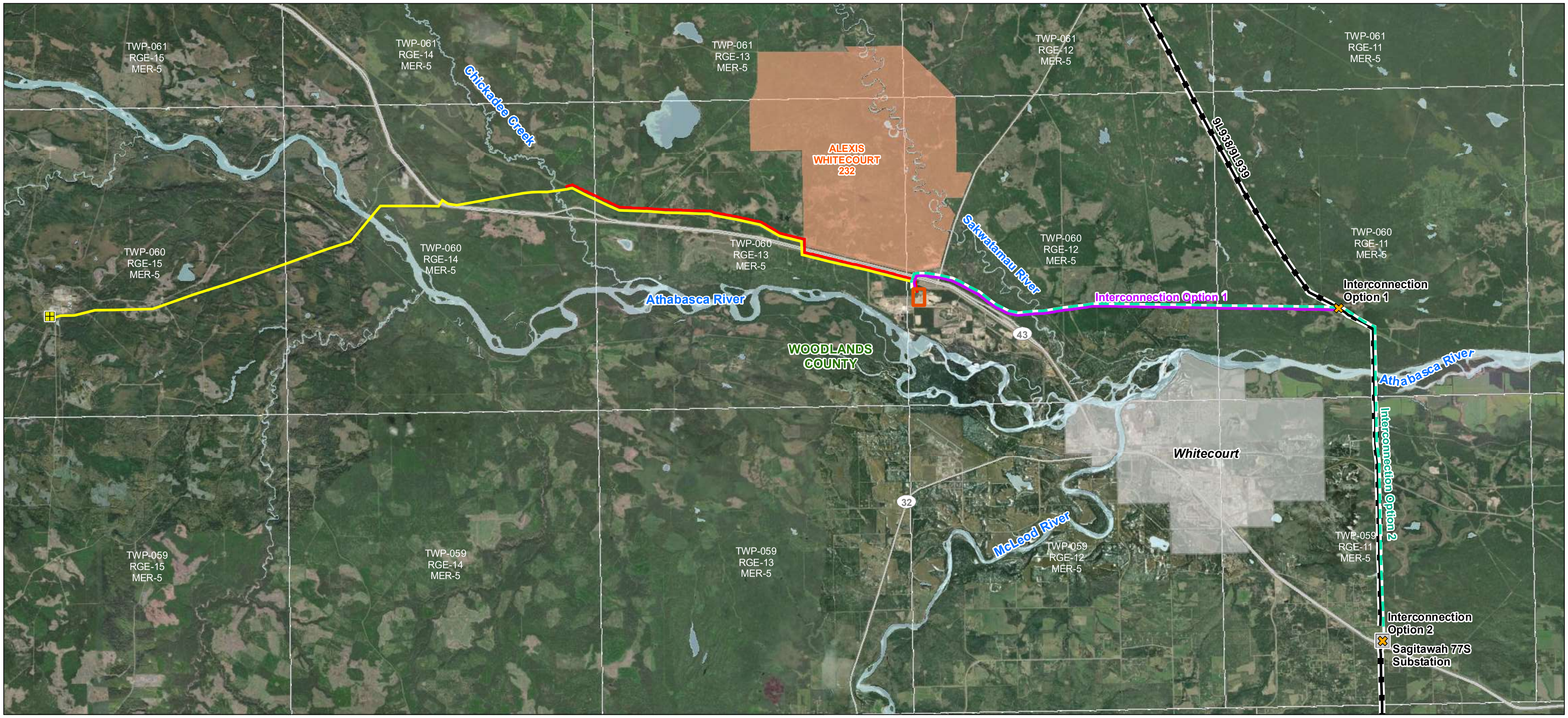
Moraine Initiatives Ltd. (MIL) is pleased to submit this Detailed Project Description for the Moraine Power Generation Project (the Project). This Detailed Project Description has been prepared following the Impact Assessment Agency of Canada (IAAC, or the Agency) Guide to Preparing an Initial Project Description and a Detailed Project Description (IAAC 2020).

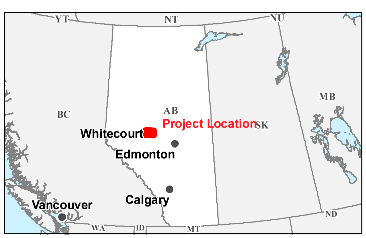
The Project consists of four principal components:

1. A natural gas-fueled power generation facility (PGF), consisting of combined cycle gas turbine (CCGT) electricity generation equipped with a post-combustion integrated carbon dioxide (CO_2) capture facility (ICCF), all on a common central site;
2. A 240 kilovolt (kV) transmission line interconnection between the PGF and existing Alberta Interconnected Electric System (AIES) 240 kV infrastructure in the vicinity of the Project;
3. A CO_2 pipeline to convey CO_2 captured by the ICCF to a proximal third-party CO_2 sequestration injection site; and
4. A natural gas pipeline connecting the PGF to the NOVA Gas Transmission Ltd (NGTL) natural gas transmission network.

The principal components are described more fully in Section 9.1, Project Components. The PGF will be constructed at a brownfield site located at SW 18-60-12-W5M & NW 7-60-12-W5M in Woodlands County near Whitecourt, Alberta (AB). The general locations of the Project components are shown in Figure 1.1. Natural gas from the NGTL pipeline network will be used for power generation at the PGF, which will generate approximately 465 megawatt (MW) of electricity for delivery to the AIES via the transmission line interconnect. Captured CO_2 will be collected and transported via a CO_2 pipeline for injection into a subsurface storage reservoir in a deep underground saline aquifer geological formation.

All Project components are located within the province of Alberta.





Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Government of Alberta and Canada, Stantec and General Electric
3. Background Image: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- Interconnection Site
- Existing Substation
- NGTL Windfall Meter Station
- Interconnection Option 1
- Interconnection Option 2
- Preferred CO_2 Pipeline Route
- Preferred Natural Gas Pipeline Route
- Proposed Power Generation Facility
- AESO 240 kV Transmission Line
- First Nation Reserve
- Township
- Urban Area
- Waterbody

0 1 2 3 4 Kilometres
(At original document size of 11x17)
1:125,000

N

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Project Location
Whitecourt,
Alberta

Prepared by SL on 2023-08-17
TR by SM on 2023-08-17
IR Review by JR on 2023-08-17

Client/Project
110220760-023
Client: Moraine Initiatives Ltd.
Project: Moraine Power Generation Project
Detailed Project Description

Figure No.
1.1

Title
Project Overview

2 Proponents Name and Contact Information

Name of Project:	**Moraine Power Generation Project**
Name of Proponent:	Moraine Initiatives Limited
Address of Proponent:	4000, 421 – 7 Avenue SW Calgary, AB T2P 4K9 CA
Website	Under development
Principal Contact Person:	Roy S. Belden Vice President Moraine Initiatives Limited T: +1 (203) 229-8509 M: +1 (203) 240-4321 roy.belden@ge.com
Environmental Contact Person:	Jason Doupe Vice President Stantec Consulting Ltd. <personal information removed> <email address removed>

3 Engagement with Jurisdictions or Agencies

Since June of 2022, MIL has been engaging with locally elected officials and agencies to inform them of the Project and answer questions. Engagement has included introduction emails and one-on-one meetings.

Federal, provincial, and municipal agencies that have been engaged about the Project are listed in Table 3.1. Those agencies that provided comments during IAAC's Public Comment Period are also included in Table 3.1 below. Engagement with agencies and stakeholders will continue through the evolution of the Project.

Table 3-1 Federal, Provincial and Municipal Agencies Engaged

Agency	Date	Purpose of Engagement	Outcome/Issues Raised
Federal			
Impact Assessment Agency of Canada	August 30, 2022	Introduction of Project and clarification of Project classification	Project was determined to be a Designated Project. The Agency provided a list of Indigenous nations to engage
Provincial			
Alberta Electric System Operator (AESO)	June 2022	Connecting the Project to the provincial grid	MIL have engaged with AESO in connection with the Electrical Interconnection Process.
Alberta Utilities Commission (AUC)	Q2 2023	Introduction of the Project to the Alberta power generation regulator	The AESO and MIL will submit applications to the AUC in Stage 3 of the AESO connection process
Aboriginal Consultation Office (ACO)	September 1, 2022	Determination of Indigenous engagement requirements	MIL was directed to use the online Landscape Analysis Indigenous Relations Tool to identify Indigenous governments to engage
Municipal			
Woodlands County	July 8, 2022	Notification to the County to introduce the Project	Virtual meeting date was set.
	July 20, 2022	Introduction of the Project and components that were being included in the Project	Virtual meeting – General discussion and questions surrounding Project details, timelines, opportunities
	October 5, 2022	Update on Project status	General discussion about Project status and early-stage development activities underway

Table 3-1 Federal, Provincial and Municipal Agencies Engaged

Agency	Date	Purpose of Engagement	Outcome/Issues Raised
Town of Whitecourt	June 30, 2022	Notification to the County to introduce the Project	Virtual meeting date was set
	July 20, 2022	Introduction of the Project and components that were being included in the Project	Virtual meeting – General discussion and questions surrounding Project details, timelines, opportunities
	October 5, 2022	Update on Project status	General discussion about Project status and early-stage development activities underway
	June 27, 2023	Indigenous Open House	Invited all 29 Indigenous nations identified by IAAC to a Project information session in Whitecourt, AB, which included a Project site visit
	June 28, 2023	Public Open House	Invited residents and stakeholders to a Project information session. Storyboards were set up around the room at the Whitecourt Golf and Country Club

3.1 Summary of Issues

The Agency provided MIL a high-level summary of issues based on written submissions to the Agency about the Project during the comment period on the Summary of the Initial Project Description, as submitted by MIL. The following Table 3.2 provides a written response to each comment, including a reference to where additional details may be found throughout the DPD.

Table 3-2 Summary of Issues

Subject Matter	Response
Accidents and Malfunctions	
Need for further information on potential accident and malfunction scenarios that could lead to environmental and human health effects, and the Proponent's capacity to mitigate and address potential effects.	Detailed accidents and malfunction scenarios are not included as part of the DPD process and potential effects from accidents and malfunctions are completed if an Impact Assessment (IA) is required. A list of potential accident and malfunction scenarios that we have identified is included in Section 9.3.4. Design and operation of equipment is completed to include safeguards to protect against such occurrences of accidents and malfunctions and further, contingency and emergency response procedures will be developed and implemented if an unplanned accident or malfunction event were to occur. Safeguards that are part of the equipment components will also be included in the natural gas-fueled power generation facility (PGF), CO_2 Pipeline, Natural Gas Pipeline and Transmission Lines, Section 9.1.
Follow the Canadian Environmental Protection Act, 1999 and regulations when developing the emergency preparedness plan.	The Project will commit to following the Canadian Environmental Protection Act for developing an emergency preparedness plan.
Acoustic Environment	
Recommend an assessment of potential Project effects including the location of sensitive receptors (e.g., hospitals, schools, retirement complexes, assisted care homes) and traditional land use when identifying potential Project related acoustic impacts on human health. Recommend establishing sensitive receptor locations in consultation with Indigenous nations.	MIL will undertake a Noise Impact Assessment for the Project pursuant to the provincial AUC rule 007, which includes identifying potential noise sensitive receptors in the study area, including residential dwellings, hospitals, etc., and consultation with local Indigenous communities, such that noise impact from the Project on those noise receptors can be assessed, and the Project noise compliance can be confirmed with the noise limits (i.e., Permissible Sound Levels) following the Alberta Utilities Commission (AUC) Rule 012: Noise Control. A baseline noise assessment was completed in July 2023, the results of which are included in section 19.3 of the DPD.
Clarify noise complaints and resolution procedures, noise attenuation plans, potential mitigation measures and follow- up and monitoring plans.	Once the Project's design has sufficiently progressed, with detailed Project equipment configuration and noise source data available, detailed noise impact assessment modeling will be done to evaluate the noise impact from the Project to the surrounding environment and sensitive receptors. If necessary, noise mitigation measures may be recommended, and noise attenuation plans can be developed. Potential mitigation measures are provided in Section 19.3. In accordance with the procedures of AUC Rule 012 Section 5, noise complaints, if any, can be filed and investigated, and resolved in a timely manner. If noise monitoring is necessary to address a complaint, a Noise Complaint Investigation Form of AUC Rule 012 will be completed and followed. MIL intends to develop a policy to address any third-party comments, concerns, and inquiries throughout construction and operations of the PGF.
Alternative Means of Carrying out the Project	
Clarify the availability of alternate carbon storage hubs for storage of carbon dioxide captured during Project operations.	A cornerstone of Alberta's hub model is that each hub project must provide open access to potentially allow CO_2 emissions from multiple industrial sources to be stored in a single sequestration area. Accordingly, the Athabasca Banks Carbon Hub Project will be developed independently and potentially sequester CO_2 from other industrial sources in the region. If the Athabasca Banks Carbon Hub is determined to not be viable, or does not proceed for any reason, MIL can consider other potential hubs to sequester its CO_2. At present, there are several other hubs under development within 100 km of the Project for consideration. Availability of alternative CO_2 sequestration hubs that could be used for storage of the CO_2 have been identified in Figure 12.1 in Section 12 of the DPD.
Alternatives to the Project	
Concern that renewable power generation (wind and solar) would be a preferable, reliable alternative to the Project and would be better suited to meet Canada's goals for net-zero greenhouse gas emissions by 2050.	As described in Section 7.1, the purpose of the Project is to supply reliable, affordable, and dispatchable (on-demand) low-emitting generation (LEG) to Albertans. Based on MIL's estimates, we believe the cost of power from the proposed combined-cycle with integrated carbon capture that generates baseload, near-zero emission power compliant with Canada's recently proposed Clean Electricity Regulations would be competitive with the cost of wind generation (stand-alone). This is even before considering the additional, significant cost of firming-up the wind generation (or other non-emitting but intermittent generation resources, such as solar) with battery energy storage or other technologies to meet the high base load factor energy demand from Alberta's industrial, commercial and residential users, which will only increase with further electrification of the economy.
Atmospheric Environment	
Concerns regarding the effects of the Project on air quality, including vehicular traffic, construction and operation, and decommissioning. Recommend using equipment with engines that meet Tier 4 emission standards to assist in mitigating the air quality impacts of the Project.	Where possible, the Project will consider retaining contractors with Tier 4 compliant vehicles or requesting that contractors use Tier 4 vehicles if available. As design and contracting processes develop, consideration for the use of equipment that meets higher guidelines will be explored. Off-site parking and shuttle for construction personnel will also be considered to reduce the potential source points of air emissions. An idling policy will also be considered for the Project.
Recommend including the location of sensitive receptors (e.g., hospitals, schools, retirement complexes, assisted care homes) and traditional land use when identifying potential Project -related air quality impacts on human health and the potential health effects from short-term increases in contaminant concentrations in ambient air due to Project activities.	A receptor map/figure is provided in Section 19.3 to identify sensitive noise receptors near the Project (e.g., Eagle River Tourism RV Park). Additional information pertaining to air quality and impacts on human health, will be provided in Section 19.2.

Table 3-2 Summary of Issues

Subject Matter	Response
Atmospheric Environment (con't)	
Need for complete inventory of all potential air pollutants: nitrogen dioxide, sulphur dioxide, dust, particulate matter, carbon monoxide, ozone, volatile organic compounds, polycyclic aromatic compounds, metals and other substances that may be released (including diesel exhaust emissions), predicted residual effects on air quality from Project construction, operations, and maintenance, and an exclusion list of all air pollutants and the justifications for exclusion.	Additional information pertaining to air pollutants has been added to the DPD including a high-level estimate of construction and decommissioning emissions (see Section 19.2). A detailed list of contaminants of potential concern (COPC) will be evaluated should an Impact Assessment (IA) be required. Additionally, an air quality assessment, including modelling of a range of COPCs, will be done to support the provincial Environmental Protection and Enhancement Act (EPEA) application. The suite of COPCs included in this assessment for the EPEA application will consider those air pollutants listed in Section 19.2, and justification will be provided for those Table 7.3 that are excluded.
Confirm greenhouse gas emission estimates; the emissions intensity values are different between Table 7.3 and Table 23.1.	Revisions have been made to the GHG emissions estimates and intensity values to be consistent in the reporting in Table 7.3 and Table 23.1.
Climate Change and Greenhouse Gas Emissions	
Concern that the capture rate of 94.32% described in the Initial Project Description does not reflect current technological capabilities of Carbon Capture, Utilization, and Storage units. Need for additional data to understand the predicted emissions reduction anticipated for the Project.	Amine absorption of CO_2 from gas streams is a mature and commercially proven technology, having historically been used in the natural gas processing industry. The application of the amine-based CO_2 absorption process in natural gas combustion exhaust gas streams has been technically and commercially proven globally over several decades. Prospective licensors of the amine-based CO_2 absorption process for CO_2 removal from natural gas-fired combined cycle power generation exhaust gas, in conjunction with potential EPC contractors for the construction of power generation-CCS projects, are offering a guaranteed CO_2 removal rate of at least 95%, with associated liquidated damages provisions and financial assurances to backstop this process performance guarantee.
Need for additional information regarding the potential benefits of carbon offsetting and the share of emissions intended for storage and utilization.	Additional information regarding CO_2 emissions offsetting options have been included in Section 23. Updates to the share of emissions intended for storage and utilization have been included in Section 9.1.1.2 of the DPD. Calculations have also been revised in Section 7, Table 7.3 and Section 23, Table 23.1.
Clarify the Project's greenhouse gas emissions (including during construction and decommissioning phases) and contribution to climate change with consideration of the Strategic Assessment of Climate Change and the Government of Canada's long-term goal to achieve net-zero emissions by 2050. Provide a description of the planned mitigation measures, technologies, and best practices to be applied, including measures being considered to reduce the Project's greenhouse gas emissions on an ongoing basis.	Additional information has been included in Section 23 to clarify the Project's GHG emissions and contribution to climate change with consideration of the Strategic Assessment of Climate Change and the Government of Canada's long-term goal to achieve net-zero emissions by 2050.
Clarification on reduction of emissions due to new technologies (i.e. carbon capture) and clarification that new technologies will not trigger additional project effects.	The amine-based CO_2 capture process planned to be used in the Project is commercially proven and widely deployed having been historically used in the natural gas processing industry. This technology has also been demonstrated at a similar scale to MIL for electric power plants. Air Quality modelling and other environmental effects analysis will be completed as part of the provincial Environmental Protection and Enhancement Act application for the Alberta Environment and Protected Areas Department and will consider emissions and effects from the operation of the amine-based CO_2 capture process (ICCF) in that assessment.
Describe the Project's resilience to future climate change, and where relevant, how it is considered in Project design.	In the planning and design of the Project, consideration is being given to the following items to provide greater resilience to future climate change: • Vulnerability to forest fires: ensuring the CCGT air intake and filtration system are designed to accommodate air particulate loading from forest fire smoke • Ensuring adequate groundwater supply capacity to the Project, taking into account the possibility of reduced groundwater availability due to long-term droughts • Ensuring that the PGF surface runoff pond capacity and runoff water discharge capacity are sized for appropriate extreme stormwater events, as storm severity may increase over time • Aerial cooler/condenser design to accommodate extreme summer high temperature conditions The design of the CCGT equipment has been done in consideration of worldwide applications including in extreme temperatures (higher or lower). For example, the turbine planned for the Project is routinely operating where temperatures are considerably higher (e.g., Saudi Arabia, Qatar).
Cumulative Effects	
Concerns regarding the Project's contribution to cumulative effects given the density of industrial development within the Project area.	MIL has considered the cumulative effects associated with developing this Project on the current landscape and has implemented a number of measures to reduce impacts to the terrestrial, aquatic and cultural environment. This includes siting of the PGF on an existing aggregate quarry with considerable existing disturbance. The natural gas and CO_2 pipelines and transmission line are all proposed to be sited adjacent to existing rights-of-way, to limit disturbance to Crown lands where Treaty Rights could be practiced. Access to the ROW areas will be restricted during construction and decommissioning/reclamation activities for safe operation of equipment. Environmental and culturally sensitive features will be identified during the development phase of the Project in order that the Project infrastructure such as pipelines, transmission lines and access roads can avoid these areas.

Table 3-2 Summary of Issues

Subject Matter	Response
Cumulative Effects (con't)	
Concerns regarding the Project's contribution to cumulative effects to air quality, particularly as a result of Project -related increases in traffic volumes, in combination with other industrial activities in the area.	The air quality assessment indicated some NO2 concentrations could exceed the federal CAAQS; however, that is based on a very conservative scenario where the adjacent ANC facility operates at maximum approved emission rates, which it does not. Further description to outline the potential contribution from the Project on cumulative Air Quality will be completed when detailed equipment scopes for the Project have been developed for both construction and operations. Additional information pertaining to traffic volumes and Project access has been included in Section 9 (Project Activities and Physical Works). The Whitecourt vicinity may experience an increase in traffic volumes during construction of the Project. Increased traffic volumes are assumed to be short-term in duration, during the construction phase. Access road upgrades, to support the increase in traffic volumes, will be evaluated in coordination with Alberta Transportation and Economic Corridors (TEC) and local municipalities. A Traffic Impact Assessment will be completed as part of the Environmental Protection and Enhancement Act (EPEA) application or as part of the IA, should it be required. Traffic mitigation measures will also be implemented, if needed, and could include bussing, and adjusting shift hours to alleviate congestion.
Concerns regarding the Project's contribution to cumulative effects on traditional land use and the health and economic conditions of Indigenous peoples.	As described in Sections 13 and 21, there may be overlap between the linear Project components and the land used for traditional uses. The effects are anticipated to be limited to the construction activities and are expected to be temporary. The PGF is within an area that is currently zoned for resource extraction and has been cleared, and therefor the opportunity for traditional practices would be limited. The key themes emerging from engagement through both the IAAC consultation and MIL-led engagement are provided in Section 4.1. Concerns regarding the Project's contribution to cumulative effects on traditional land and resource use and the health and economic conditions of Indigenous peoples, are discussed in Section 21 and are based on the information available to date.
Economic and Social Conditions	
Concern that the long-term environmental impacts and financial costs of the Project outweigh the short-term benefits.	Project benefits are provided in Section 7.3. Benefits of the Project are considered long-term (i.e., greater than 30 years) and include providing affordable baseload, near-zero emissions electricity to Albertans, in compliance with the draft Canada Clean Electricity Regulations. Construction and operation of the Project will serve to diversify the economic base and increase regional spending, allowing businesses to establish or expand thereby fostering continued economic growth in the local area. The adverse effects from the Project are considered short-term and are focused primarily during the construction phase (disturbance to terrestrial landscape, dust and emissions from vehicle use, impacts of social services from construction workforce, etc.) but will be largely mitigated during operation, and into the decommissioning and closure phases (i.e., reclaim terrestrial landscape, reduced workforce needs during operation, etc.). Additional information is provided in the DPD in Section 7.3.
Clarify the hiring strategy, including permanent employment anticipated, source and quantity of labour, how peak construction workforce will be staffed and how labour shortages and/or accessibility to trained labour were considered, as well as additional information on hiring local workers particularly from Indigenous nations.	Hiring strategies have not yet been developed for the Project to date. Further details are provided in Section 15.
Clarify the economic, social and ecological effects as well as employment opportunity effects on communities.	Economic, social and ecological effects based on employment opportunities and effects on communities is beyond the DPD evaluation and would be included in an analysis if an IA has been deemed necessary by the Agency. Understanding the baseline information of the communities and local economic, social and ecological effects is important to develop employment plans and strategies as the Project moves forward. Applying MIL policies and commitments to hiring, training, and supporting local resources will be included as part of the development of the Project, as outlined in Section 15.
Need for baseline information regarding the local economy, demographics and an assessment of whether the available local labour force will be sufficient to support construction and operation of the Project.	Baseline information regarding the local economy and demographics have been included based on the information publicly available to date, see Section 15.1. Labour force information and MIL policies on hiring strategies are provided in Section 15.2.
Clarity on anticipated Federal financial support for the Project.	The Canadian government has proposed a number of incentives to encourage private sector companies to invest in clean electricity projects and CO_2 capture as Canada moves toward a decarbonized electricity grid by 2035. These include investment tax credits related to CO_2 capture value chain investment and clean electricity investment, potential development stage funding support, and potential contract structures intended to reduce risk related to future greenhouse gas emissions reduction regulation. MIL expects to explore some or all of these types of federal supports to the extent available and appropriate in pursuit of its overall business objectives. This information is included in Section 16.
Federal Lands	
Need for information about potential effects of the Project on reserve lands, as it relates to effects on current use of lands and resources for traditional purposes and impacts on the exercise of Aboriginal and/or Treaty Rights, and associated mitigation measures.	Potential effects of the Project were included in the IPD and have been updated in the DPD with any new information on Indigenous nation communities use of potentially affected land and resources for traditional purposes and associated impacts on the exercise of Aboriginal and / or Treaty Rights. The evaluation of potential effects is also being updated in the DPD in consideration of feedback from Indigenous nations through the ongoing engagement process. For detailed information, see Section 21 and 22.
Request a figure and description showing the location of all Project components in relation to reserve lands in the proximity to the Project.	A figure showing the location of the Project components in relation to reserve lands in the proximity to the Project was provided in the Initial Project Description (IPD) (Figure 4.1). The distance and direction of the Indigenous nations relative to the PGF will be provided in Section 4.1.1.

Table 3-2 Summary of Issues

Subject Matter	Response
Fish and Fish Habitat	
Concerns regarding effects on fish and fish habitat through water quality and quantity on water bodies (i.e., Athabasca River) due to Project activities (i.e., herbicide usage).	As described in Section 24.4, the storage and disposal of wastes during construction and operation will comply with water management regulations and best practices. The use of herbicides will be avoided, where possible. Trenchless crossing methods will be utilized (i.e., horizontal directional drill (HDD)) where the Natural Gas Pipeline or CO_2 Pipeline crosses water courses (e.g., Athabasca River). Fish and fish habitat assessments will be completed prior to construction to identify potential effects that may occur during construction and select appropriate mitigation measures that will be implemented to reduce potential effects.
Concerns regarding Project effects on fish and fish habitat, including from changes in flows, waterbody or wetland crossings, groundwater draw down, cumulative effects and entrainment of fish in the outlet. Request information on fish habitat that will be disturbed and mitigation measures that will be implemented to address effects (i.e., offsetting measures).	The Project is not expected to have direct adverse effects to fish and fish habitat in the Athabasca River or other water bodies, as there is no instream work planned. Additionally, groundwater supply will only be considered as a viable option if it can be demonstrated to provide a sustainable yield including confirmation that no adverse effects are anticipated to the aquatic environment. Evaluation of the groundwater availability and effects on the surrounding environment are included in Section 19.4.
Clarity on how effects of noise created from Project activities will effect fish and fish habitat.	Noise emissions from Project activities that may have a potential effect on fish and fish habitat will be limited to the construction phase of the Project through use of construction equipment and vehicles. While the effects of noise may cause localized disruption to fish use where installation of pipelines crossing water courses by trenchless method (HDD) will occur, these effects will be localized, and of short-term duration. Additional information will be provided in Section 19.3.
Clarity on proposed watercourse crossing locations, mitigation measures and potential for residual effects, harmful alteration or fish habitat destruction as a result of water course crossings.	Watercourse crossings will be installed using a trenchless method (HDD) for both the Natural Gas Pipeline and CO_2 Pipeline. Identified crossings will be reviewed against the fish and fish habitat protection provisions of the Fisheries Act. A list of anticipated crossings will be provided in Section 19.7.
Follow-up and Monitoring Programs	
Clarity on reclamation protocols.	Reclamation planning and requirements will follow provincial guidelines/requirements under EPEA, as provided in the approval to construct and operate the PGF. For pipelines and the transmission line, an environmental evaluation plan, and conservation and reclamation plan will be prepared and submitted to provincial regulators for approval prior to construction. Reclamation of CO_2 Pipeline, Natural Gas Pipeline, and Transmission Line disturbance areas will be done immediately following construction activities and will follow best management practices.
Clarity on the types and amounts of chemicals being used during construction and operations of the Project and information on the standards being implemented for use, including accident and malfunction mitigations and monitoring.	A list of typical chemicals used for construction of power plants, pipelines and transmission lines, along with a list of chemicals that may be used in the operation of the PGF have been included in Appendix F. Chemicals listed in both lists are routinely used during construction or operations of power plants and industrial facilities throughout Alberta and Canada. While an effects assessment for accidents and malfunctions from construction and operations of the Project are not included in the DPD, design and safeguards that will be implemented during construction / operations of facility equipment, pipelines, and the stormwater management facility (SWMF) have been included in the description of the Project Components in Section 9.1.
Human Health and Well-Being	
Need for identification and locations of existing and potential future human receptors, including sensitive receptors.	A receptor map has been provided to identify sensitive noise receptors in the vicinity of the Project (e.g., Eagle River Tourism RV Park) and a table of receptors for the Air Quality assessment has been included in the DPD.
Clarity if identity factors (e.g., age, gender, family status, occupation) result in some human health receptors being affected differently by Project-related changes.	A Gender-based Analysis Plus level of evaluation is beyond the DPD evaluation and would be analyzed if an Impact Assessment is deemed necessary by the Agency. At this point in time, none of the Project-related changes are anticipated to result in certain human health receptors being affected differently than others.
Need for additional information regarding potential effects, residual effects and mitigation measures of the Project on health, social, and economic conditions.	Information has been provided in Section 22 addressing the potential effects to the health, social or economic conditions of Indigenous peoples of Canada. This information is based on (i) known potential changes that may occur as a result of carrying out the Project; (ii) information that is available to the public; or (iii) derived from any engagement undertaken with Indigenous peoples of Canada. Further evaluation of potential effects on air quality and noise, which may then lead to potential effects on health are provided in Section 19. Social and economic benefits of the Project are included in Section 7.3.
Recommendation that Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment be used when assessing Project effects to human health.	Should the Project require an impact assessment under the Impact Assessment Act, an assessment of Project effects to human health will be considered based on Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment.
Indigenous and Stakeholder Consultation and Engagement	
Need for meaningful consultation with Indigenous nations throughout the life of the Project, including with respect to Project design, pre-disturbance assessments, environmental monitoring, and adaptive management.	MIL recognizes that each Indigenous nation may have a different perception, expectation and/or definition of what is meaningful consultation. MIL is committed to an ongoing two-way dialogue that provides opportunities for Indigenous nations to easily, respectfully, comfortably and safely ask questions and learn about the Project. At the same time, MIL wants to learn about the Indigenous nation and understand the potential effects of the Project on the Indigenous and Treaty Rights of the Indigenous nations. Through meetings and engagement to date, MIL understands that some Indigenous nations require capacity funding to participate and traditional land use studies to better understand the potential effects of the Project on their Treaty and Indigenous Rights. MIL is working to acknowledge this at the same time as moving the Project forward in an economically efficient manner. Please refer to Section 4, which outlines the engagement that MIL has conducted to date.

Table 3-2 Summary of Issues

Subject Matter	Response
Indigenous and Stakeholder Consultation and Engagement (con't)	
Clarify how the Project will advance reconciliation with Indigenous nations.	MIL's understanding of advancing reconciliation comes from the 94 calls to action published by the National Centre for Truth and Reconciliation. Focusing on Call to Action 92, MIL is committed to an engagement process that incorporates input from Indigenous nations to facilitate information sharing, two-way dialogue in order to understand perceived Project impacts, incorporate mitigation measures, consider Indigenous knowledge, and advance reconciliation where possible and as understood. See Section 4 for further information regarding the ongoing engagement with Indigenous nations.
Need for continued engagement with potentially affected Indigenous nations regarding access to traditional lands, and how current land use will be affected by Project activities.	MIL is committed to ongoing engagement with potentially affected Indigenous nations with respect to all aspects of the Project including access to traditional lands. The Project location is planned to be built on provincial Crown land. As a result, MIL is obligated to follow access and disposition rules associated with provincial Crown land. During construction, temporary restrictions to access in areas of active construction for safety considerations will be used. Rights-of-way areas for the Natural Gas Pipeline, CO_2 Pipeline, and the Transmission Lines will not be access-restricted outside of the construction and reclamation phases of the Project. The Power Generation Facility will be built on what is currently an aggregate quarry. For safety reasons, the PGF will not be accessible to the general public or Indigenous nations during the construction or operation phases of the Project without prior authorization from MIL.
Need for funding and capacity support for Indigenous nations to support consultation and engagement activities.	Through meetings and engagement to date, MIL understands that some Indigenous nations require capacity funding to participate and funding for traditional land use studies to better understand the potential effects of the Project on their Treaty and Indigenous Rights. MIL is working to acknowledge these requests while at the same time moving the Project forward in an economically efficient manner.
Indigenous Peoples' Current Use of Lands and Resources for Traditional Purposes	
Clarify potential and perceived Project effects to current land use, including wildlife and vegetation, corresponding potential effects to traditional food sources and food security of Indigenous peoples, and how these effects will be addressed.	MIL is meeting with Indigenous nations to gain a better understanding of the potential and perceived Project effects to current land use. Some Indigenous nations have requested TLU studies to determine the potential effects of the Project on traditional land uses. MIL is interested in understanding where these studies would take place, what information can be shared from these studies, how long will these studies take, and what the cost of these studies would be. Information from these land use studies would help MIL mitigate potential Project effects either through avoidance, relocation, or other adjustments.
Need for additional information on the area of crown land that the Project will occupy.	The land proposed for the Project is provincial crown land, or under lease through dispositions to other operators through the Alberta Government. MIL is happy to share shape files to assist Indigenous nations in understanding the location of the Project and its components.
Concerns regarding potential Project-related changes to Indigenous nations, including cultural and traditional practices, food security, Indigenous health, cultural and spiritual practices, medicinal, ceremonial and other traditional purposes.	MIL is committed to meeting with Indigenous nations to understand how the Project may affect their Indigenous and Treaty Rights including cultural and traditional practices, food security, Indigenous health, cultural and spiritual practices, medicinal, ceremonial, and other traditional purposes. Further details on the potential effects on traditional lands are included in Section 21.
Need for additional information on impacts to traditional land use including impacts to teaching locations, hunting and gathering areas and impacts to the function of wetlands due to Project activities.	MIL is committed to meeting with Indigenous nations to answer questions about the Project, listen to concerns and work collaboratively on mitigation measures, which may include avoiding, or reducing potential impacts. To date, no specific locations have been identified where teaching, hunting and gathering areas occur within any of the Project component footprints. MIL will provide shape files and offer discussions with subject matter experts to help Indigenous nations understand the Project and the potential extent of change and/or disturbance to the land. As described in the response to question 38, during construction, temporary restrictions to access in areas of active construction may be limited for safety considerations. Areas for pipeline and transmission lines will not be restricted outside of the construction and reclamation phases of the Project. The PGF will be built on what is currently an aggregate quarry. For safety reasons, the PGF will not be accessible to the general public or Indigenous nations during construction or operation phases of the Project without prior authorization from MIL.
Indigenous Peoples' Health and Well-being	
Need for information on how the potential effects of the Project will impact Indigenous peoples health and well-being, including potential impacts to drinking water, country foods, and increased contaminants.	Baseline data regarding the health, social and economic conditions of Woodlands County and the Town of Whitecourt, including Indigenous peoples was included in Section 15. Further discussion on the potential effects on Indigenous Health, Social, and Economic Conditions are in Section 22.
Need for more information on waste and disposal procedures, specifically on the usage of chemicals and the generation of amine waste, and identification of adverse effects to Indigenous nations.	As described in Section 24, all waste will be managed according to acceptable waste handling procedures, policies, and guidelines. A list of typical chemicals used during construction and operations has been included in Appendix F. Volumes will be determined during feed studies and waste monitoring will be completed per applicable provincial regulations.
Clarify potential surface water and groundwater quality changes from the Project, including consideration on how Indigenous Peoples consume water, and the potential effects on human health.	As described in Section 19.4, the Project has the potential to change groundwater quantity and quality during the construction and operation phase, however, sustainable yield to groundwater withdrawal will be met and no direct/indirect effects on groundwater quality are anticipated. Evaluation of the groundwater availability and effects on the surrounding environment are also included in Section 19.4. As described in Section 19.7, there are no plans for instream works. Where pipelines cross the Athabasca River, or other smaller watercourses, it is assumed that they will be installed using a trenchless method (e.g., horizontal directional drill (HDD)). During construction, there will be limited surface water changes and no permanent impacts are anticipated.

Table 3-2 Summary of Issues

Subject Matter	Response
Indigenous Peoples' Rights	
Clarity on the assessment of impacts to Rights and its incorporation into Project effects assessment and potential mitigation measures.	Sections 21 and 22 provide additional details on assessment of potential Project effects and mitigation measures applicable to the Rights of Indigenous nations.
Need for meaningful engagement with Indigenous nations to facilitate a common understanding of Section 35 Rights.	MIL recognizes that each Indigenous nation may have a different perception, expectation and/or definition of what is meaningful consultation. MIL is committed to an ongoing two-way dialogue that provide opportunities for Indigenous nations to easily, respectfully, comfortably and safely ask questions and learn about the Project. MIL wants to learn about the Indigenous nation and understand the potential effects of the Project on the Indigenous and Treaty Rights of each Indigenous nation. MIL believes through active listening and ongoing meetings it will find a way to work cooperatively with Indigenous nations. One of the most important aspects of this work will be to generate a common understanding of the Section 35 Rights of each Indigenous nation. Please refer to Section 4, which outlines the engagement that MIL has conducted to date.
Need for additional information regarding the cumulative impacts of multiple projects in the region on the exercise of Aboriginal and/or Treaty Rights.	Cumulative impacts are looked at during the IA process and would also include cumulative impacts of multiple projects in the region on the exercise of Aboriginal and/or Treaty Rights. For the DPD, potential effects are focused on at the Project level, while also considering the potential cumulative impacts to assist in assessing and siting Project components.
Indigenous Peoples' Social and Economic Conditions	
Clarity on the intent to support diversity and inclusion through the Proponent's hiring and training strategies; need for a better understanding of the target percentage for hiring Indigenous people and if Indigenous people who live near the Project will receive priority employment and training opportunities.	As Project planning progresses, hiring and training strategies will be further defined and developed, and these strategies, described in Section 15.2, will provide opportunities for Indigenous and local contractors and individuals.
Need for additional information regarding baseline health, social, and economic conditions and associated potential Project effects on local Indigenous peoples.	Baseline data regarding the health, social and economic conditions of Woodlands County and the Town of Whitecourt was included in Section 15 of the IPD. Additional information pertaining to the health, social and economic context in the region will be included in the DPD based on information that is available to the public or derived from the engagement that has been undertaken to-date.
Indigenous Peoples' Spiritual, Physical, and Cultural Heritage	
Clarity on the potential effects to physical and cultural heritage, including sites of archaeological and paleontological significance to Indigenous peoples, due to the construction and operation of the Project and information on notification processes to Indigenous nations if artifacts are recovered.	Potential effects to historical resources managed under the Alberta Historical Resources Act (HRA) are mitigated through a commitment to complete the requirements issued by Alberta Arts, Culture and Status of Women (AACSW) through the regulatory process. Distribution of historical resource site information is controlled by AACSW. Detailed process information on how the information and potential effects to historical resources will be assessed can be found in Section 21. If/when possible, Traditional Land Use (TLU) information will be included in the selection of Historical Resources Impact Assessment (HRIA) target areas, pursuant to the HRA requirements, as directed by AACSW. If TLU sites are identified during the HRIA field assessment, these will be communicated through a high-level summary of HRIA results that can be provided to Indigenous nations who have identified their interest in receiving such information.
Migratory Birds and their Habitat	
Potential for effects to migratory birds during all Project phases, and corresponding obligations stemming from the Migratory Birds Convention Act, 1994 and its regulations.	Wildlife surveys were conducted in the spring and summer of 2023 to support assessment of the potential effects of the Project on wildlife and wildlife habitat, including migratory birds. The key findings and results from the 2023 wildlife surveys are provided in Sections 14.1.6 and 19.8. Mitigation measures will be developed to reduced potential effects, as needed and could include following restricted activity periods, conducting bird nest sweeps immediately prior to earth works and vegetation clearing, and following setbacks to water bodies, including wetlands.
Need for information on potential impacts, monitoring, avoidance, and mitigation measures of linear Project features on migratory birds.	Mitigation measures are listed in Table 19.25 to address potential effects on wildlife and wildlife habitat (including for species at risk and migratory birds). Key findings and results of the 2023 wildlife surveys have been provided in Section 19.8.
Navigation	
Clarity required on whether any Project component (including incidental activities) may impact a navigable waterway and if so, more information required on potential impacts to navigable waterways and any potential mitigation measures.	There will be no impacts to navigable waterways, as defined in the Canadian Navigable Waters Act, as a result of the Project. Refer to Section 19.7 for further details on potential effects on surface water and fish and fish habitat.
Species at Risk, Terrestrial Wildlife, and their Habitat	
Concerns regarding potential adverse Project effects on species at risk and wildlife as a result of construction activities and operation of Project components.	Wildlife surveys were conducted in the spring and summer of 2023 to support assessment of the potential effects of the Project on wildlife and wildlife habitat, including species at risk. The key findings are provided in Section 19.8.
Need for additional information regarding species at risk (including COSEWIC species) and critical habitat that may interact with the Project, potential effects to species at risk, and mitigation measures to be implemented.	The key findings and results from the 2023 wildlife surveys have been provided in Section 19.8. Mitigation measures to address potential effects on wildlife and wildlife habitat (including for species at risk and migratory birds) are listed in Table 19.24. As Project planning progresses, further mitigation measures, including site-specific mitigation measures will be developed.
Need for information on baseline and pre-construction/pre-clearing surveys that will be conducted to identify any hibernaculum and maternal roosting sites.	The key findings and results from the 2023 wildlife surveys have been provided in Section 19.8. Pre-construction wildlife sweeps will be completed prior to construction of the Project.

Table 3-2 Summary of Issues

Subject Matter	Response
Vulnerable Population Groups (Gender Based Analysis Plus)	
Consider Gender-Based Analysis Plus throughout the Project lifecycle, engagement, consultation, mitigation, and to create baseline conditions. Include potential gender-based violence risks.	A Gender-Based Analysis Plus (GBA Plus) is not assessed to this level of detail for the DPD. Gender-based analyses will be assessed as the Project progresses. A GBA Plus will be provided should an Impact Assessment be required. Information available from the Canadian Census has been used to update the information provided in Section 15.
Need for a detailed description of the Proponent's corporate diversity strategy and how it is relevant to Gender-Based Analysis Plus and employment and labour issues regarding the Project.	As a Project company that is currently wholly owned, by the General Electric Company, MIL observes GE's corporate diversity and inclusion commitment. As described in Section 15.2, MIL is committed to the development of a hiring and training strategy for the Project which outlines policies and training strategies that provides opportunities for Indigenous and local contractors and individuals. These policies will address a workplace code of ethics, environmental, health, and safety, respectful workplace/workplace violence, including gender-based considerations, and will include hiring and training measures, incorporating gender equality and diversity employment measures and practices.
Clarify how inclusion will be tracked and how gaps in representation will be addressed with respect to engagement.	All groups who have identified that they would like to be involved in discussions with MIL have been included in the engagement process. Who participates from the FN groups during engagement meetings is not being tracked for inclusion or for demographics. It is up to the nations to decide who is best to represent them and their views / input as a whole in the meetings with the MIL team. MIL is open to meeting with all members who want to be engaged and how they want to be engaged – this has included Elders, Chiefs, Councillors, Consultation Managers, community members and the nations or Indigenous nation's consultant (if they have one). If additional groups have been identified through the IAAC process to be added, MIL has reached out to those groups to be included in the engagement process. MIL has committed to continue to engage with Indigenous nations who have indicated they would like to participate throughout all Project phases.
Water – Groundwater and Surface Water	
Need information on the possible Project-related changes to water availability, local weather, and water bodies in consideration of climate change.	As described in Section 19.4 and 19.7, Project-related changes to water availability, local water, and water bodies are not anticipated. Construction of the pipelines and transmission line will result in the temporary disturbance of wetlands; all water course crossings will be done by trenchless methods of construction (see Section 19.6).
Potential effects to water quality and corresponding obligations stemming from the Fisheries Act and its regulations.	There are no anticipated direct effects to fish bearing watercourses as a result of the Project. Watercourse crossings will be installed using a trenchless method (HDD) for both the natural gas pipeline and CO_2 pipeline. Identified crossings will be reviewed against the fish and fish habitat protection provisions of the Fisheries Act.
Need for additional information regarding Project -related effects to groundwater and surface water quality and quantity as a result of Project activities and proposed mitigation measures.	Additional details regarding groundwater and the potential effects from the Project are described in Section 19.4. As Project planning progresses, groundwater evaluations and locations for source water will be developed along with site-specific mitigation measures. As described in Section 19.7, there are no watercourses in proximity to the PGF site, the Athabasca River is approximately 800 m south of the site, with multiple third-party infrastructure and operations that exist or are occurring between the PGF site and the river. As a result of the mitigation measures described in Section 19.7, it is unlikely that construction of the Project will affect surface water quality/quantity and fish or fish habitat.
Wetlands	
Need for additional information regarding potential direct and indirect effects of the Project on wetland functions (e.g., biological, social, hydrological).	As described in Section 19.6.1, there will be no direct effects on wetlands for the construction of the PGF. Desktop wetland mapping has been completed and included in the DPD to assess potential temporary or permanent effects to wetlands during construction of the pipelines and transmission line (Section 19.6.1). Mitigation measures for working in and around wetlands have been provided in the DPD and will be updated prior to construction of the Natural Gas Pipeline, CO_2 Pipeline, and Transmission Line.
Need for additional rationale to support the conclusion that the Project will not adversely affect wetlands, and information regarding proposed measures to mitigate effects to wetlands.	Desktop wetland mapping has been included in the DPD to assess potential temporary or permanent effects to wetlands during construction of the Natural Gas Pipeline, CO_2 Pipeline, and Transmission Line (Section 19.6.1). Mitigation measures are listed in Table 19.22 to address potential effects on vegetation and wetlands.
Other	
Need for clarification regarding the length and orientation of the pipelines, transmission lines and associated Project infrastructure, timelines for construction, and approvals required.	The length and orientation of the Natural Gas Pipeline, CO_2 Pipeline, and Transmission Line and associated Project infrastructure, timelines for construction, and approvals is described in Section 11 (Project Schedule), Section 13 (Geographic Information), and Section 18.2 (Provincial Regulatory Requirements).
Clarity regarding the use of existing roads (i.e., Highway 43) and exits that will be used for the Project activities and if new road infrastructure will be required.	Existing roads will be utilized for construction and operations of the Project. Increased traffic volumes are assumed to be short-term in duration, during the construction phase. Access road upgrades, to support the increase in traffic volumes, will be evaluated in coordination with Alberta Transportation and Economic Corridors (TEC) and local municipalities and a Traffic Impact Assessment will be completed as part of the Environmental Protection and Enhancement Act (EPEA) or as part of the IA, should it be required. Mitigations measures to reduce traffic during construction will include use of coordinated bussing to and from the PGF site, and the Natural Gas Pipeline, CO_2 Pipeline, and Transmission Line. During operation of the PGF, traffic will be limited to onsite workforce and maintenance vehicles.

4 Engagement with Indigenous Nations

4.1 A Summary of the Results of Engagement

MIL acknowledges and respects the Rights of Indigenous people. In the fourth quarter of 2021, MIL began identifying which Indigenous nations are located in proximity to the Project using both federal and provincial resources. Starting in Q4 of 2021, MIL conducted the following engagement activities to share Project information, answer questions, and listen to concerns with Indigenous nations:

- sent letters of introduction between June and December 2022;
- added additional Indigenous nations to the engagement list as and when self-identified by a nation or identified by the Agency
- set up a Project website with Project information;
- participated in 26 one-on-one meetings with 19 nations either virtually or in-person;
- circulated a Project information package to all Indigenous nations that provides similar information as the Initial Project Description (IPD) without the technical references and was suggested as a companion piece to the IPD;
- followed up after sending Project information was emailed with phone calls to confirm information was received;
- invited all 30 Indigenous nations identified by the Agency to a Project information session and site visit in Whitecourt, AB on June 27, 2023;
- emails were sent in August 2023 with Project updates regarding DPD to all Indigenous nations.

Table 4.1 summarizes Indigenous engagement to date.

Table 4-1 Summary of Indigenous Engagement

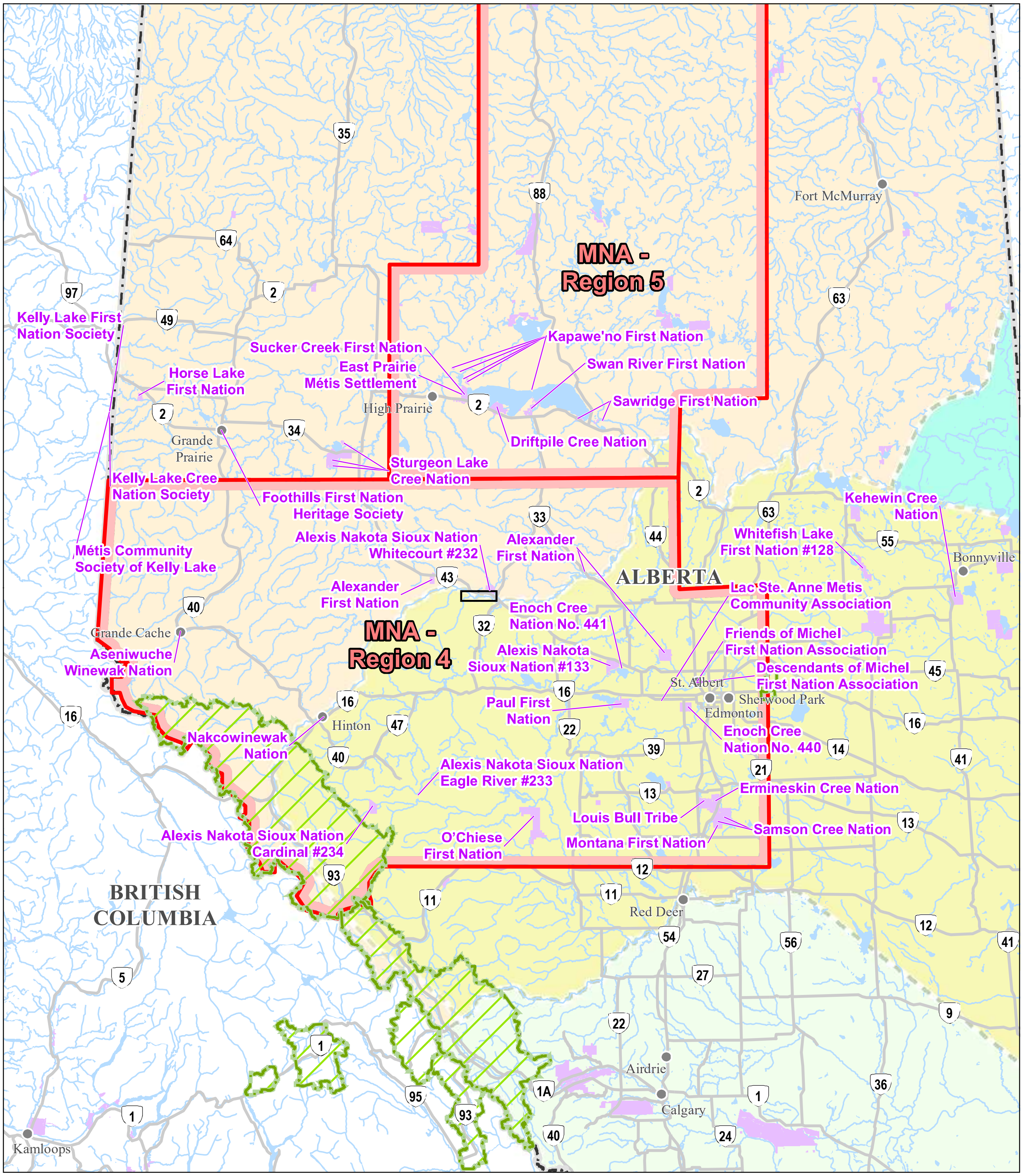
Indigenous Nation	Distance from Project to Community	Received Introduction Letter	Received Project Information Package	Met with MIL before IPD	Attended Indigenous Gathering	Met with MIL after IPD	Filed Comments with IAAC
Alexander First Nation	42 km* W	x	x	x		x	
Alexis Nakota Sioux Nation	0.5 km N	x	x	x	x	x	x
Aseniwuche Winewak First Nation	220 km W	x	x		x	x	
Driftpile Cree Nation	126 km N	x	x	x		x	x
East Prairie Metis Settlement	136 km N	x	x				
Enoch Cree Nation #440	150 km SE	x	x	x			
Ermineskin Cree Nation	204 km SE	x	x		x	x	
Foothills First Nation Heritage Society	222 km NW	x	x			x	
Horse Lake First Nation	280 km NW	x	x		x		
Kapawe'no First Nation	148 km N	x	x				
Kehewin Cree Nation	319 km E	x	x		x	x	
Kelly Lake Cree Nation Society	298 km W	x	x		x	x	
Kelly Lake First Nation Society	298 km W	x	x		x	x	
Lac Ste. Anne Metis Community Association	138 km SE[1]	x	x	x	x	x	x
Louis Bull Tribe	201 km SE	x	x		x	x	x
Metis Community Society of Kelly Lake	298 km W	x	x				
Metis Nation of Alberta, Region 4	0 km[2]	x	x		x		
Metis Nation of Alberta, Region 5	82 km N[3]	x	x			x	x
Michel First Nation (Descendants of Michel First Nation Association)	155 km SE[4]	x	x				
Michel First Nation (Friends of Michel Society)	144 km[5]	x	x		x	x	x
Montana First Nation	220 km SE	x	x				
Nakcowinewak Nation	146 km SW	x	x				

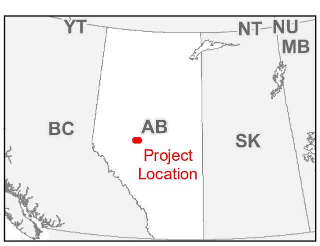
Table 4-1 Summary of Indigenous Engagement

Indigenous Nation	Distance from Project to Community	Received Introduction Letter	Received Project Information Package	Met with MIL before IPD	Attended Indigenous Gathering	Met with MIL after IPD	Filed Comments with IAAC
O'Chiese First Nation	148 km S	x	x	x		x	x
Paul First Nation	112 km SE	x	x	x	x		
Samson Cree Nation	211 km SE	x	x	x	x	x	
Sawridge First Nation	136 km NE	x	x			x	
Sturgeon Lake Cree Nation	138 km NW	x	x				
Sucker Creek First Nation	136 km N	x	x				x
Swan River First Nation	129 km N	x	x				
Whitefish\Goodfish Lake First Nation	256 km E	x	x	x	x	x	x

NOTES:
[1] Distance measured from the office of Lac Ste. Anne Community to the Project
[2] The Project is located within Metis Nation of Alberta Region 4
[3] Distance measured from the border of Metis Nation of Alberta Region 5 to the Project
[4] Distance measured from the office of Descendants of Michel First Nation Association to the Project
*kilometres

MIL is committed to an engagement process throughout the life of the Project that provides opportunities for input from Indigenous nations to shape the Project by sharing information and participating in two-way dialogue to understand perceived Project impacts. MIL is interested in building long term relationships with Indigenous nations that allow for collaboration to discuss and address mitigation measures, consider Indigenous knowledge, and advance reconciliation where appropriate. MIL will continue to provide Project information throughout the life of the Project to Indigenous nations that identifies procurement and employment opportunities during construction and operations. MIL recognizes that effective communication requires adapting to the protocols and priorities of the different Indigenous communities and that funding may be needed to support the participation of Indigenous nations in the regulatory process. MIL looks forward to working collaboratively, respectfully, and productively with Indigenous nations through the life of the Project from the initial fieldwork through operations and finally decommissioning, remediation and restoration.





Project Area
First Nation Reserve
Métis Nation of Alberta (MNA) Regional Zone
Treaty Boundary
Treaty 10 (1906)
Treaty 6 (1876)
Treaty 7 (1877)
Treaty 8 (1899)
Populated Place
Major Road
National Park
Provincial Boundary

N

0 40 80
Kilometres

Stantec

Project Location
Woodlands County, AB

Prepared by SL on 2023-08-17
TR by MP on 2023-08-17
IR Review by JR on 2023-08-17

Client/Project
110220760-021
Client: Moraine Initiatives Ltd.
Project: Moraine Power Generation Project
Detailed Project Description

Figure No.
4.1

Title
Location of Indigenous Nation and Nearby Federal Lands

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4.1.1 Engagement Activities Undertaken

MIL has attempted to meet with each of the Indigenous nations at least once. The purpose of these meetings is to introduce the MIL Project team, provide information about the Project, answer questions, learn about each Indigenous nation, understand how each Indigenous nation wants to be engaged, and listen to and learn how Indigenous and Treaty Rights may be affected by the Project.

Over the past year, various attempts to communicate and connect with the Indigenous nations have been made including sending letters of introductions that include requests to meet, providing Project information packages, engaging in meetings, setting up a Project website, and hosting an Indigenous gathering to provide information about the Project. Each communication email is followed up with at least one phone call.

Most communications have been sent to the consultation coordinator of each nation unless otherwise advised. In some cases, the Chief and/or Councillors have been contacted.

4.1.1.1 Introductory Letters and Responses

The Project team utilized the Government of Alberta's (GOA) online Landscape Analysis Indigenous Relations Tool (LAIRT) to initially identify Indigenous nations who may practice Rights in the Project area. An introductory letter introducing MIL, providing a high-level description of the Project, and requesting a meeting was sent in June 2022 to the 13 Indigenous nations identified using the LAIRT tool. A sample letter is included in Appendix C. In August 2022, the Project team requested advice from the Agency to identify and confirm which Indigenous nations have claims, known traditional territory, treaties, or agreements in proximity to the Project. A similar letter of introduction introducing MIL, providing a high-level description of the Project and requesting a meeting was sent to the additional 19 Indigenous nations identified by the Agency in August 2022. The Agency revised this list to 28 Indigenous nations in March 2023; however, the Project continues to engage 30 Indigenous nations (see Table 4.1) based on feedback from the Indigenous nations. Key themes emerging from responses to the introductory letters included requests for more detailed Project information, maps of the Project area, engagement and consultation expectations, requests for capacity funding and traditional land use studies, as well as socioeconomic and investment opportunities.

4.1.1.2 Project Information Packages

On May 18, 2023, following the Agency's distribution of the IPD, MIL emailed each of the Indigenous nations engaged, a letter and Project Information Package (PIP). A copy is included in Appendix C. The letter attached to the email explained that the PIP, which described the Project in plain language, was not a replacement for the IPD but was recommended as a companion piece to help Indigenous nations better understand the Project and the IPD. In the letter, MIL provided contact information and requested meetings to address questions and understand how the Project may affect the Indigenous and Treaty Rights of Indigenous nations.

The letter also included notice of an All Indigenous Meeting that would be held at the end of June 2023.

The PIP discussed electricity generation, carbon capture and associated potential Project effects. The purpose of the PIP was to provide each Indigenous nation sufficient information for them to determine if their Treaty or Indigenous Rights may be affected by the Project and provide an opportunity for Indigenous nations to share their comments and concerns regarding the Project and ask questions.

4.1.1.3 One-on-One Meetings

Between July 2022 and August 2023, 30 meetings took place between MIL and Indigenous nations. Ten meetings were in-person with the remainder held virtually using Microsoft Teams. Meetings included introductions of the attendees from the Indigenous nations and MIL, their respective organizations, a presentation of the Project, and responses to questions. These meetings provided an opportunity for the Indigenous nations to ask questions about the Project and for MIL to learn about the Indigenous nations' connection to the Project, how the Indigenous nations would like to be engaged, concerns of the Indigenous nation regarding the Project, and how the Project may affect Indigenous and Treaty Rights.

During each initial meeting with an Indigenous nation, MIL presented a brief overview of the Project followed by a two-way discussion. A copy of the MIL presentation is included in Appendix C.

Since the IPD, MIL has participated in 17 meetings with Indigenous nations, which has allowed MIL a greater opportunity to learn more about the Indigenous nations and to better understand how they may be affected by the Project.

4.1.1.4 Project Website

A website has been set up, morainepower.ca, containing Project information, links to the IAAC website Public Comment page, and a Project email address to allow for questions to be posed. As of September 1, 2023, the Project website has received 1,415 views by 415 different visitors. Additionally, five emails were received with questions.

4.1.1.5 Indigenous Gathering

MIL invited all of the Indigenous nations listed in Sections 4.1.1 and 4.1.2 to a meeting in proximity to the Project location near Whitecourt, Alberta. This meeting was an opportunity for the Indigenous nations to meet the proponent in person, receive a more detailed Project overview, and discuss the Project, as well as discuss the regulatory process.

The meeting began with an informal reception the evening of June 26, 2023. On Tuesday, June 27, 2023, a series of meetings, and discussions took place to share information about the Project, and the regulatory process. Opportunities for one-on-one meetings took place on the afternoon of June 27, 2023, as well as during site visits to show the location of various Project components. The meetings offered Indigenous nations the opportunity to meet with MIL to discuss the Project, visit the proposed Project site, ask questions, and provide comments.

Two people from each Indigenous nation were compensated for:

- mileage

- an honorarium for June 27
- travel meals for June 26 and June 28
- two nights hotel in Whitecourt, AB

In addition, three meals were provided on June 27 at the meeting and breakfast on June 28 prior to departure.

A total of 18 Indigenous nations responded to the invitation and 14 Indigenous nations attended. A total of 32 people representing 14 Indigenous nations participated in the meeting.

4.1.2 Results of Engagement & Key Issues Raised

Topics raised and discussed through engagement to date include details regarding the Project, electricity generation and CO_2 capture and sequestration, the engagement process, socio-economic, investment opportunities, capacity funding, Traditional Land Use studies, and Project timelines. A summary of issues and concerns that Indigenous nations have expressed are summarized below. MIL has considered the issues and concerns and their responses are incorporated into the referenced section of this Detailed Project Description as well as the responses to the SOI (see Section 3).

Through meetings with and written correspondence from Indigenous nations, MIL responded to questions and learned of concerns. This correspondence covered various topics that have been put into the themes listed below (Table 4.2). MIL's response to these topics discussed are outlined in the sections of this DPD referenced in the second column.

Table 4-2 Summary of Key Issues, Concerns, and MIL Responses

Key Issues, Concerns, and MIL Responses	DPD Section where Key Issues, Concerns, and MIL Responses are Addressed
Discussion of site selection and Project location	Section 9
Understanding Project components	Section 9
Water use (source, quantity) and water management (Quality)	Section 19.4, Section 19.7
Surface water and fish and fish habitat	Section 19.7, Section 22
Wildlife and wildlife habitat	Section 21
Noise impacts	Section 22
Air quality	Section 22
Traditional land use studies	Section 21
Terrestrial environment concerns (wildlife, plants, wetlands, soil)	Section 19
Greenhouse gas or climate change concerns related to Project components (power generation and CO_2 capture)	Section 23
Section 35 of the Constitution	Section 4
Interest in traditional land use studies	Section 22

Table 4-2 Summary of Key Issues, Concerns, and MIL Responses

Key Issues, Concerns, and MIL Responses	DPD Section where Key Issues, Concerns, and MIL Responses are Addressed
Indigenous procurement and equity opportunities	Section 9.3, Section 22
Capacity funding	Section 4, Section 22
Ongoing meaningful engagement and consultation	Section 4, Section 21, Section 22
Project operations	Section 9.3
Project benefits	Section 7.3
Questions regarding the proponent	Section 2
Potential effects on Indigenous health, social, and economic conditions	Section 22
Potential effects on traditional land use, physical and cultural heritage, and historical, archaeological and palaeontological resources	Section 21

4.1.3 Plans for Future Engagement

MIL is committed to meaningful engagement with Indigenous nations throughout the life of the Project to:

- keep Indigenous nations informed of updates on the Project
- understand how Indigenous nations want to be engaged
- understand how the Project may affect Indigenous and Treaty Rights
- address, mitigate, and eliminate concerns, where possible
- identify opportunities for input from Indigenous nations to shape the Project by sharing information and participating in two-way dialogue to understand perceived Project impacts
- build long term relationships that allow for collaboration to discuss and address mitigation measures, consider Indigenous knowledge, and advance reconciliation where appropriate
- provide Project information that identifies procurement and employment opportunities during construction and operations. Support the participation of Indigenous nations in the regulatory process

MIL recognizes that meaningful engagement has a different meaning for each Indigenous nation. MIL will seek to accomplish meaningful engagement throughout the life of the Project by establishing opportunities for two-way conversations to share information. MIL anticipates learning that each Indigenous nation may be affected differently and to a different extent, which may result in engagement activities varying across the Indigenous nations.

MIL anticipates future engagement will include continuing to participate in one-on-one meetings with Indigenous nations. It will also include arranging community meetings, and site visits, as well as providing capacity funding and funding for traditional land use studies, where appropriate. MIL will continue to document and track information exchanged in the meetings with Indigenous nations.

4.1.3.1 Future One-on-one Meetings

MIL will continue to participate in one-on-one meetings with Indigenous nations as the Project proceeds. MIL is interested in understanding how the Project may affect Indigenous and Treaty Rights and will want to work through management and mitigation plans with Indigenous nations.

MIL appreciates that the topics and agendas with each Indigenous nation may differ and will rely on each Indigenous nation identifying the agenda items for discussion at each meeting. These meetings provide a confidential opportunity to discuss specific topics in greater detail for the Indigenous nations that are potentially affected by the Project.

Meetings will occur both in-person and virtually as required and will provide the opportunity to offer one-on-one meetings to Indigenous nations and stakeholders to answer questions, discuss issues and concerns, and consider potential mitigation measures.

4.1.3.2 Future Community Meetings

MIL is interested in participating in community meetings that are planned collaboratively with Indigenous nations to meet the individual needs of their community, provide opportunities for subject matter experts to answer questions, and provide opportunity for Indigenous nations to meet senior members of the MIL team. These meetings may include a presentation or may be set up similar to an open house with storyboards that allow people to learn about the Project by walking around the boards. The MIL Project team subject matter experts will participate to answer questions and note takers will documents conversations. The format is expected to vary depending on the requests of the community.

4.1.4 Communication Material

Engagement will rely on communication material developed to explain and describe Project information and updates. The communication material will be provided to Indigenous nations in various formats including emails, fact sheets, presentations, maps, frequently asked questions storyboards, and Project website updates. Information will include brief, plain language updates at Project milestones. Photos and/or graphics will be included to help explain technical aspects of the information.

Feedback from meetings, and questions will be documented and used to advise Project development including engagement tactics and communication material. Efforts will be made to identify comments, concerns and questions with the originating stakeholder group and Indigenous nation.

4.2 Engagement with Public and Other Stakeholders

To date, engagement with the public and other stakeholders has included one-on-one meetings, the development of a Project website, and an open house. The PIP was distributed to the Town of Whitecourt and Woodlands County on May 18, 2023, as a companion to the IPD. MIL will continue to engage as the Project proceeds and anticipates expanding the reach of its engagement with stakeholders through future open houses and presentations.

4.2.1 One-on-one Meetings

MIL met multiple times with locally elected officials and staff at both the Town of Whitecourt and Woodlands County, separately, to discuss the Project and answer questions as discussed in Section 3.

4.2.2 Project Website

A Project website was developed at the following link, morainepower.ca, to provide easy access for the public to obtain information regarding the Project and ask questions. The information on the website includes the same information that was posted on the storyboards at the Public Open House in Whitecourt on June 28, 2023. Two educational videos are included on the website to explain how a combined cycle power plant works, and how the CO_2 capture equipment works. The website has a link to the Project information on the Agency's website and has a comment button to allow website visitors to post questions. As of September 1, 2023, the Project website has received 1,415 views by 415 different visitors. Additionally, five emails were received with questions.

4.2.3 Public Open House

A Public Open House took place in the Town of Whitecourt on June 28, 2023, to provide an overview of the Project to the general public and answer questions. Storyboards were set up around the room at the clubhouse of the Whitecourt Golf Course Club with Project information. Subject matter experts from the Project team interacted with participants to explain information and answer questions. Facilitators and note takers interacted with participants to help people feel comfortable and encourage questions and comments, which were documented.

The Open House was advertised for two weeks on CFCW AM and CIXM FM radio. An advertisement was posted in the Whitecourt Star newspaper. In addition, phone calls were made to the Town of Whitecourt, Woodlands County, the local MLA's constituency office, and the Chamber of Commerce to advise them of the Open House and encourage their participation. Approximately 30 people attended the Open House.

4.2.4 Stakeholder Questions

MIL will respond promptly, in plain language, to questions asked of stakeholders. These questions may come through the Project website, or directly from stakeholders.

4.2.5 Future Engagement with the Public and Stakeholders

MIL will continue to engage with the public and other stakeholders. The Project website will be updated with Project information after important milestones such as filing of the DPD or other regulatory approval document filings or open houses. Questions from stakeholders will be monitored and responded to in a timely fashion. As the Project proceeds, MIL anticipates the list of stakeholders growing, which will provide additional opportunities for MIL to present Project information to stakeholders. MIL expects to have one or more additional open house in Whitecourt as the Project proceeds in the regulatory review process.

5 Regional Assessments and Relevant Environmental Studies

There are no known regional assessments of the area in which the Project is located that were conducted under Sections 92 or 93 of the *Impact Assessment Act*; however, there have been several environmental studies conducted for projects in central Alberta that overlap portions of the Project, such as Enbridge Northern Gateway, Pembina Peace Pipelines System Expansion and Alliance Pipeline.

Regional reports that have overlapped the Project area include:

- Regional Forest Landscape Assessment, Upper Athabasca Region. Prepared for: Forest Management Branch, Alberta Environment and Sustainable Resource Development. December 2012.

6 Strategic Assessments

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

Part B: Project Information

7 Project Purpose and Need

7.1 Project Purpose

The purpose of the Project is to supply reliable, affordable, and dispatchable (on-demand) low-emitting generation (LEG) to Albertans. By incorporating carbon capture and storage (CCS), the Project will produce near-zero emissions baseload electricity to meet the needs of Alberta electricity customers. The Project is planned to be compliant with the proposed Canada's Clean Electricity Regulations, and thus is aligned with – and a material step forward in Alberta toward – Canada's objectives of achieving net-zero emissions from the electricity grid by 2035 (GOC 2022).

Lower-efficiency, emissions-unabated coal and gas-fired generation is being retired as the decarbonization of Alberta's electricity supply progresses. The Project will provide LEG electricity to support both existing economic activity in Alberta as well as increased electrification of other sectors such as transportation, heating and cooling, and industry, towards Canada's 2050 net-zero emissions objectives.

The Project's dispatchability (ability to produce electricity on-demand, regardless of weather or other conditions) and baseload operation will positively contribute towards ensuring that Albertans are kept safe – in terms of providing electricity for cooling during extreme heat events, and heating during extreme cold periods – at times when output from renewable electricity sources in Alberta has historically been limited or non-existent.

7.2 Project Need

In Alberta's competitive wholesale electricity market structure, the need for new electricity generation sources is established by a combination of regulatory and market (commercial) forces.

From a regulatory perspective, both provincial and federal environmental regulations are driving the decarbonization of Alberta's electricity generation, through the commitments to retire coal-fired power generation by 2030, and now the proposed Canada Clean Electricity Regulations. Under the draft framework of the proposed Clean Electricity Regulations, only LEG fossil-fueled generation will be permitted to operate in an unconstrained manner by 2035 and thereafter. It is thus very likely that less efficient, existing gas-fired generation in Alberta nearing end-of-life, such as coal-to-gas units, older gas-fired combined cycle units, and older industrial cogeneration units, will retire by 2035, creating a capacity need that will be met by new LEG dispatchable/reliable sources such as the Project.

In addition, increased electrification on an economy-wide basis – in particular transportation, building heating and cooling, and industry – is a crucial enabler of Canada's ability to achieve its net-zero by 2050 objectives. This drives the need for new LEG dispatchable/reliable sources such as the Project to provide adequate supplies of near-zero emissions electricity to meet this incremental electrification demand and load growth generally.

According to the Alberta Electric System Operator (AESO), and its July 2022 “Pathways to Decarbonization” report, Alberta will need an additional 1,000-1,600 MW of dispatchable/baseload LEG generation to meet demand growth, including new electrification load, in the 2030-2035 period (near-term) (AESO 2022). Additionally, in the same time frame, if the Alberta system sees the retirement of 2,600 MW of existing near-end-of-life coal-to-gas generation, nearly 1,300 MW of coal-fired generation, and just a quarter of its current gas-fired industrial cogeneration capacity (25% of 5,245 MW ≈ 1,300 MW), this creates a need for 6,200 – 6,800 MW of new dispatchable/baseload LEG to fill this gap in the 2030-2035 period (near-term). This provides the opportunity for the Project to be a near-term and long-term solution to produce reliable, LEG electricity for Alberta.

With respect to the need to site the Project in the Whitecourt region of Alberta, this area of the province offers a unique coincidence of both infrastructure capacity and Project execution support capabilities to host the Project. This includes:

- Access to over 1,000 MW of new generation interconnection capacity on the existing 240 kV transmission network in the Whitecourt area. This means there would be no expected need for transmission system expansion to accommodate the Project
- Access to the required natural gas supply for the Project, without system expansions on the NGTL natural gas transmission network
- Proximity to a proposed CO_2 sequestration hub, capable of permanently storing of all the Project’s captured CO_2
- Excellent road and rail access to the Project site, distance from residential areas, and access to a large skilled labor base and energy industry supply and services

7.3 Project Benefits

The Project will create substantial long-term benefits for Albertans, Indigenous nations and other Canadians. The Project will provide a reliable supply of affordable LEG electricity from a dispatchable resource. The Project will generally be operable at full capability regardless of weather conditions in Alberta, including extreme cold and heat episodes, when renewable electricity supply, particularly wind, has historically been virtually nonexistent. This will help to provide energy security and safety to Albertans to satisfying critical cooling and heating needs during these extreme weather periods.

The Project will capture and sequester CO_2 that would otherwise have been emitted to atmosphere. The value of the resulting lower carbon intensity power generation will be recognized through the emission attributes created under the relevant provincial or federal regulatory policy, and/or, over time, as the grid reflects lower carbon intensity over time, in the market value of clean electricity as reflected in the AESO power market. The Project will generate substantial taxes over its planned operating life. Taxes generated by the Project are valued over a 30-year period. Indicative net present values (NPV_{10}) of these taxes are estimated in the range of:

- $165 million in federal corporate income tax
- $90 million in provincial corporate income tax
- $75 million in municipal property taxes (Woodlands County)

The Project is expected to generate considerable employment in Alberta, both during the Project development and construction stages, as well as during its operation.

Table 7-1 Project Employment Generation (Person-Years of Employment)

	Construction Stage[1]	Operating Stage[2]
Alberta Direct Employment	1,500	1,280
NOTES: [1] Construction phase will be approximately 3 years [2] Operating stage is approximately 40 years		

Additionally, the portion of Project expenditures made in Canada, on Canadian goods and services, is provided in Table 7.2.

Table 7-2 Project Canadian Expenditure Estimates

	Development and Construction Stages	Operating Stage
Order-of-magnitude estimate of expenditure on Canadian goods and services	$1 Billion	$300 Million Annually

The Project will supply LEG baseload electricity to Alberta consumers. Baseload electricity could also be supplied by pairing intermittent renewables generation (e.g., wind) together with natural gas-fired "firming" generation.

In supplying LEG baseload electricity to the Alberta electric system, the Project will produce substantial greenhouse gas emissions reductions compared to renewable generation firmed by either natural gas-fired peaking generation (e.g., simple-cycle gas turbine generation), or natural gas-fired combined cycle generation. Illustratively, considering a wind generation system with a 35% annual capacity factor, the table below shows the annual CO_2 emissions reduction in generating baseload electricity from the Project, versus both of these wind-gas system alternatives, as shown in Table 7.3.

Table 7-3 Indicative Annual CO_2 Emissions – Project and Wind-Gas Alternatives

	Project	Wind + Simple Cycle Gas	Wind + Combined Cycle Gas
GWh/year	3873	3873 (35% from wind, 65% from gas)	3873 (35% from wind, 65% from gas)
GHG emissions intensity, tonnes CO_2e/MWh	0.024	Wind: 0 Gas: 0.510	Wind: 0 Gas: 0.357
GHG emissions, tonnes CO_2e/year	**94,359**	**1,282,828** **≈ 14x Project**	**897,980** **≈ 10x Project**

By making use of the robust infrastructure available in the Whitecourt vicinity and Woodland County, the Project can be developed without requiring expensive bulk system expansions on either the Alberta high voltage electric transmission system or the NGTL natural gas transmission network in Alberta. As a result, the interconnection of the Project to this existing infrastructure without the need for system expansion produces cost savings (tariff reductions) for all customers of these systems.

8 Physical Activities Regulation

The *Impact Assessment Act* (IAA), administered by the Impact Assessment Agency of Canada (the Agency), has two regulations that are applicable to the Project: the Physical Activities Regulations and the Information and Management of Time Limits Regulations.

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

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

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

The Agency has deemed the Project to be a designated physical activity, potentially subject to an IA (see Appendix B). An Initial Project Description was prepared and submitted to the Agency on May 18, 2023 (CIAR #2) for review. A Summary of Issues List (SOI) (CIAR #28) was received from the Agency on July 17, 2023. This Detailed Project Description is the final submission by MIL prior to the Agency's determination if an IA is required.

9 Project Activities and Physical Works

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

- PGF, consisting of a CCGT with ICCF
- Transmission line and interconnection infrastructure (approximate length between 15 and 25 km depending on AIES connection point)
- Natural gas pipeline from the NGTL network to the PGF site (approximate length of 30 km)
- CO_2 pipeline (estimated length of approximately 12 km)

In addition to the above components, there is ancillary infrastructure associated with the Project, including roads and utilities (including water).

CO_2 captured from the PGF will be sequestered in a third-party CO_2 storage hub, with a preference for the Athabasca Banks Carbon Hub, based on the proximity to the Project site. The Agency determined that the Athabasca Banks Carbon Hub Project is not incidental to the Project. Carbon sequestration hubs that could be utilized for the CO_2 generated by the Project are provided in Section 12.1.4.

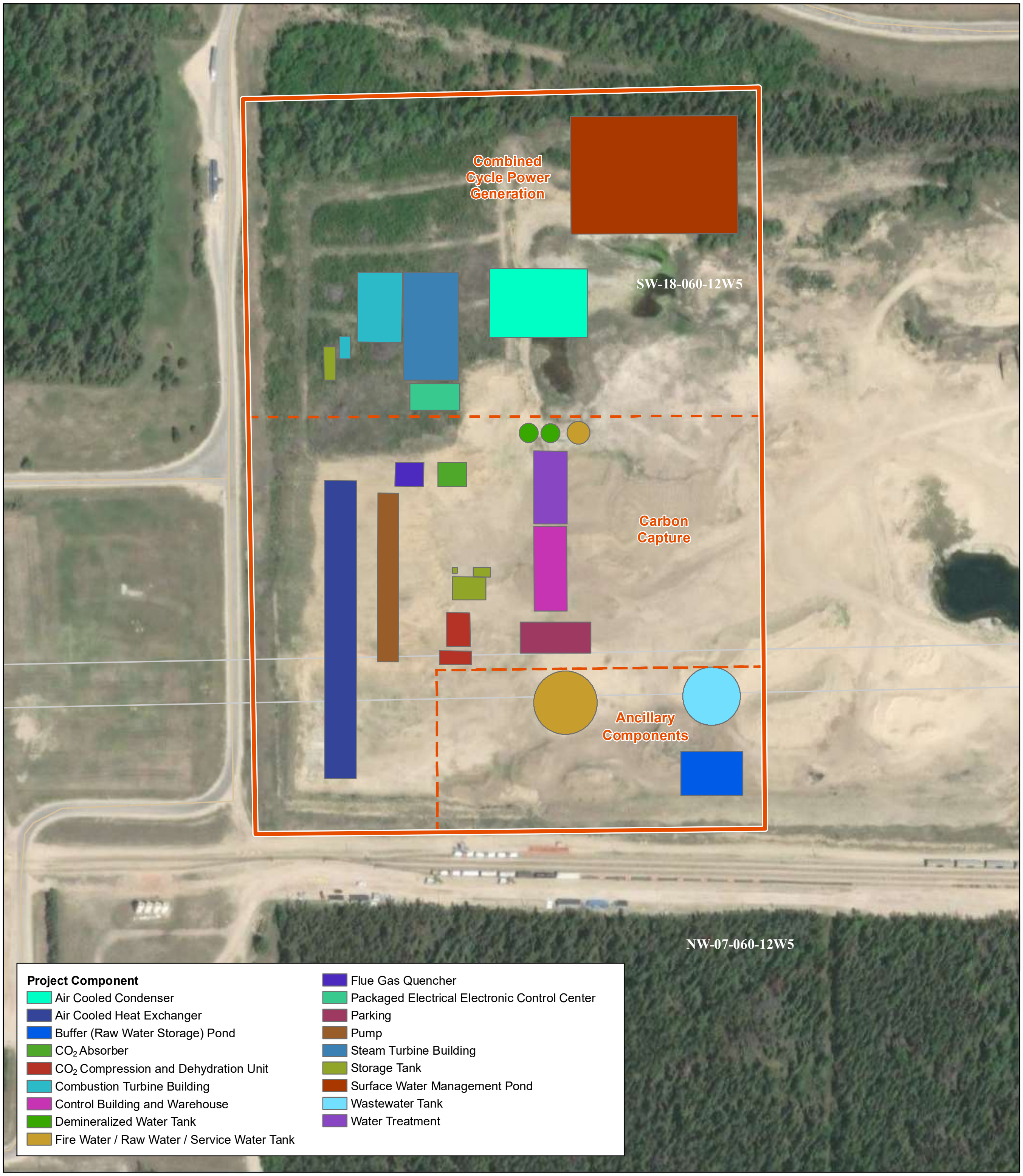
9.1 Project Components

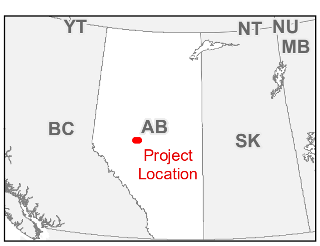
A description of the four primary Project components is provided below.

9.1.1 Power Generation Facility

The proposed PGF is comprised of two principal equipment packages: the CCGT and the ICCF. These are further described in the following sections. The PGF will be located in Woodland County, approximately 10 km west of the Town of Whitecourt, Alberta. The PGF site will be located on 19 ha of brownfield, public land (Alberta Crown-owned). The equipment general layout covers approximately 3 ha within the Project footprint.

The preliminary general layout of the proposed PGF is shown on Figure 9.1 below.





Proposed Power Generation Facility
Minor Road
Quarter Section

N

0 40 80
Meters

Project Location
Woodlands County, AB

Prepared by SL on 2023-08-17
TR by MP on 2023-08-17
IR Review by JR on 2023-08-17

Client/Project
110110760-022

Client: Moraine Initiatives Ltd.
Project: Moraine Power Generation Project
Detailed Project Description

Figure No.
9.1

Title
Plot Plan

Stantec

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9.1.1.1 Combined- Cycle Gas Turbine (CCGT)

One of the two principal components of the PGF is a CCGT to produce approximately 465 MW of net electricity. The CCGT involves installation of three main equipment packages: a gas turbine generator (GTG), a heat recovery steam generator (HRSG), and a steam turbine generator (STG). Other sub-components of the CCGT include an air-cooled condenser (ACC), natural gas compressor, two generator step-up transformers (GSU) and auxiliary systems. To minimize the exposure to ambient conditions, the gas and steam turbine sub-components of the CCGT will be installed within a building that is suitable for Alberta weather conditions. The HRSG will be built for an outdoor design and will have weather enclosures for accessing at the boiler drums. The balance of plant (BOP) is the term used in describing all other components outside of power generating equipment such as warehouses, electrical distribution buildings, pumps and compressors that will be installed in the proximity of the turbine hall building. The CCGT will also include interconnecting water, steam, compressed air, and natural gas supply lines to facilitate the operations of process equipment. There are no provisions for natural gas storage on site. Equipment will be metered for monitoring of potential leaks, pressure regulating, and safe operations. Table 9.1 lists the expected buildings or enclosures at the Project site.

Table 9-1 CCGT Facility Buildings and Enclosures

Name	Type
Administration/Control	Building
Boiler Feedwater Pumps	Enclosure
CO_2 Area Electrical Enclosure	Enclosure
CO_2 Compressor	Building
CO_2 Process Select Equipment	Enclosure, where required
Turbine House	Building
Warehouse	Building
Water/Wastewater Treatment	Building
ACC Electrical Power Distribution Centre	Enclosure
CEMS	Enclosure
Diesel Engine/Generator	Enclosure
Natural Gas Compressor(s)	Enclosure
Firewater Pump(s)	Enclosure
HRSG	Outdoor with Drum End Enclosures
Medium Voltage Electrical Enclosure	Enclosure
Potential other equipment enclosures	Enclosure

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

Table 9-2 Power Generation Major Equipment

Equipment Type – Power Generation	Number to be Installed
Air Cooled Condenser	1
Air Cooled Heat Exchanger	1
Boiler Feedwater Pumps	2
Closed Cooling Water Pumps	2
Combustion Turbine Generator	1
Condensate Pumps	2
Fire Pumps	2
Fuel Gas Dew Point Heater	1
Fuel Gas Filter/Separator	1
Fuel Gas Knockout Drum	1
Fuel Gas Metering Station	1
Fuel Gas Performance Heater	1
Generator Step-Up Transformer	1
Heat Recovery Steam Generator	1
Natural Gas Compressors	3
Pumps, typically	2
Steam Turbine Generator	1
Service/Instrument Air Compressor	2
Steam Jet Air Ejectors	2
Tanks, typically	1
Water/Wastewater Treatment System	1

Process Description of the CCGT

The CCGT structures and components are summarized in Table 9.3.

Table 9-3 Project Structures and Sub-Components

Project Component	Description
Permanent Facilities	
Multi-purpose Building	A multi-purpose building will be constructed to house the operating and maintenance staff. The multi-purpose building will include an administration/control room, warehouse, maintenance shop, and water treatment area. Secondary containment for leaks and spills of maintenance fluids and area designated for maintenance of equipment will be incorporated into the design of the building. A permanent parking lot will be located on the south side of the multi-purpose building. The approximate dimensions of the multi-purpose building will be 115 m L x 24 m W x 7.6 m H. The dimensions are subject to the final design.
Turbine Hall Building	A turbine hall building will enclose the GTG, STG, and associated auxiliary and support equipment. The approximate dimension for the turbine hall building will be 70 m L x 50 m W x 28 m H. The dimensions are subject to the final design.
Fuel Gas Compressor Building	A pre-engineered fuel gas compressor building will house the fuel gas compressors used to increase the pressure of the natural gas for combustion in the gas turbine. The approximate dimension for the fuel gas compressor building will be 25 m L x 20 m W x 8 m H. The dimensions are subject to the final design.
CO_2 Compressor Building	A pre-engineered CO_2 compressor building will house the CO_2 compressors used to increase the pressure of the carbon dioxide to a supercritical state for transportation. The approximate dimension for the CO_2 compressor building will be 65 m L x 45 m W x 19 m H. The dimensions are subject to the final design.
Glycol Closed Loop and Fin-Fan Heat Exchanger	A glycol loop will be used in a closed-cycle system to cool various STG, GTG, CO_2 Capture process equipment, and BOP equipment. The glycol loop is cooled by a fin-fan heat exchanger.
Air Cooled Condenser	The ACC is a heat exchanger which condenses steam from the steam turbine to condensate. The approximate dimensions for each ACC section will be 72 m L x 55 m W x 37 m H.
Underground Wash Water Drain Tank	An underground wash water drain tank will be located just outside of the turbine hall building. The tank will collect water from the compressor wash and will be hauled off site periodically for disposal at an approved facility. The compressor wash is demineralized water with added soap to remove soot buildup on the turbine. Washing is performed at pre-determined intervals to maintain the cleanliness of the gas turbine compressor.
Water Supply	Make-up water is primarily required for the HRSG and equipment cooling needs. Utilization of air-cooled condensers for the CCGT and air-cooled heat exchanger (ACHE) for the ICCF in place of a water-cooled apparatus minimizes the need for make-up water. The water requirement for the site is estimated at 10 litres per second (L/s) (162 gallons/minute) subject to final design. Water will be sourced from groundwater. This water is then processed in the demineralized water facility on site to bring it up to acceptable specification. Demineralized water will be stored in the demineralized water tank. For details on groundwater supply see Section 19.4.

Table 9-3 Project Structures and Sub-Components

Project Component	Description
Fire/Service Water and Demineralized Water Tanks	A fire/service water tank will supply service water for the plant as well as a reserved capacity for plant fire protection measures. The approximate holding capacity of this tank will be 2,271 cubic metres (m^3) (600,000 gallons) subject to final design. The demineralized water tank serves to improve operational reliability of the unit in the event of reduced demineralized water production. It is anticipated that the tank will hold a nominal 2-day storage for demineralized water requirements. The approximate holding capacity of the demineralized water tank will be 757 m^3 (200,000 gallons) subject to final design.
Oil/Water Separators	Oil/water separators will be used to separate oil from the water that will be collected from the facility drains (e.g., maintenance area). All oil containing equipment will be contained with drains routed to an oil/water separator.
Permanent Small Buildings	The Project will include several other permanent small buildings or enclosures of varying sizes including the fire water pump building, emergency diesel generator, power distribution modules, and various pump and equipment enclosures. The fire water pump and emergency diesel generation buildings will each be approximately 12 m L x 4 m W x 3 m H subject to final design. The power distribution module enclosures and other small enclosures vary based on equipment enclosed.
Surface Water Management Pond	The surface water management pond will be designed to collect surface water runoff only and will be designed for a 100-year 24-hour (hr) storm event, as per the Stormwater Management Guidelines for the Province of Alberta (Alberta Environment [AENV] 1999a). Surface catch basins and below-grade piping and perimeter swales will direct water and any surface runoff outside the perimeter of the PGF to the surface water management pond. The discharge of surface water will be designed to maintain existing drainage patterns and water quality so adjacent properties are not affected and to meet the requirements in both the *Environmental Protection and Enhancement Act* (EPEA) and the *Water Act*. See Section 19.7 and Appendix E for additional details on the draft conceptual stormwater management plan.
Site Access Road	The site access road exists as part of the industrial area that the Project will be built in and may be used for construction. A new access road to the PGF site will be developed off of TWP 602A that is currently used to access the pulp and paper mill facility east of the site. The road will be under MIL's care and control within the Project facility during construction and operation.
Utilities and Infrastructure	
Telecommunications	Telecommunications will be required for operation of the Project. The primary method of communication with the Project controls will be through a wide area network whose central medium for communication is fibre optics for long distances and ethernet for local. Communication medium selection is subject to final design.

9.1.1.2 Integrated CO_2 Capture Capabilities

The second principal component of the PGF is the ICCF, which will process the exhaust gas from the CCGT to capture up to 95% of the CO_2 emissions from the operation of the CCGT. All captured CO_2 will be delivered via CO_2 pipeline to a third-party saline aquifer CO_2 sequestration hub for storage. The ICCF will be integrated with the CCGT and will be a component of the operations phase of the Project. The ICCF equipment will also be designed to incorporate safeguards such as metering (e.g., shutdowns, ventilation systems, secondary containment, gas detection, continuous pressure monitoring, leak detection) to allow for monitoring of safe operation of the system.

Table 9.4 lists the types and quantities of major equipment to be installed in the ICCF.

Table 9-4 Integrated CO_2 Capture Facility (ICCF)

Equipment Type - Carbon Capture	Number to be Installed per Train
CO_2 Absorber	1
CO_2 Compressor	1 or 2
CO_2 Regenerator	1
Dehydration Unit	1
Quencher (Direct Contact Cooler)	1
Gas turbine exhaust Blower (Induced Draft Booster Fan)	1
Heat Exchangers, typically	4
Pumps, typically	2
Reclaimer	1
Reboiler	1
Tanks, typically	1
NOTE: Final original equipment manufacturer (OEM) design may change # per train	

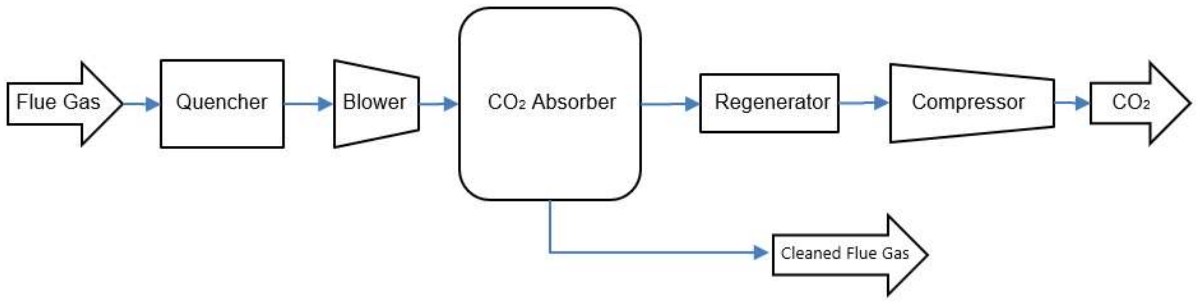
Process Description of the ICCF

The PGF's amine-based ICCF includes the following major components:

- A **Quencher** (also called a Direct Contact Cooler or DCC) to reduce gas turbine exhaust temperature entering the process
- A **Blower** (or Induced Draft Booster Fan) to ensure the gas turbine exhaust continues moving through the capture process
- An amine-based **CO_2 Absorber** that removes most of the carbon dioxide from the gas turbine exhaust stream. Treated gas turbine exhaust with reduced CO_2 content is directed back to its exhaust path to atmosphere from this component step
- The CO_2 rich amine moves into the **Regenerator** where CO_2 is boiled out of the amine using heat from a steam source. Regenerated amine is then cycled back to the absorber to capture more CO_2
- Finally, the captured CO_2 is directed into a **Compressor** to condition the CO_2 gas for the facility's export pipeline requirements. The CO_2 is then transported away from the Project toward its approved sequestration point

A simplified process flow of these components is shown in Figure 9.2.

Figure 9.2 Amine-based ICCF



A further explanation of these components is set out in the following discussion.

QUENCHER (or Direct Contact Cooler): The Quencher reduces gas turbine exhaust temperatures to optimize CO_2 capture flow and efficiency in the absorber. Particulates, water, and other soluble components removed from the gas turbine exhaust in the Quencher will build-up in the cooling contact water as it is recycled. A large volume of water will be collected in the Quencher as it is condensed from the gas turbine exhaust. To maintain the liquid recirculation rate and limit the buildup of impurities in the recirculating solution, a blowdown stream reduces the concentration of contaminants. The blowdown stream is then sent to the water treatment and wastewater streams.

BLOWER (or Induced Draft Booster Fan): In order to overcome the pressure losses through the carbon capture system, the gas turbine exhaust will require an induced draft (ID) booster fan at some position prior to the CO_2 Absorber. Given this fan is utilized to keep the gas turbine exhaust moving forward and not as part of any chemical or physical change to the gas turbine exhaust stream, it is referred to as a blower in subsequent discussion and representation on diagrams.

CO_2 ABSORBER: Cooled gas turbine exhaust from the Quencher passes through an absorber column where the amine-solvent absorbs CO_2 out of the gas turbine exhaust. Layers of packing, spray zones, and other structures facilitate liquid and gas contact for CO_2 absorption by the amine solvent. A water wash may be located at the top of the absorber to remove entrained solvent in the gas turbine exhaust. Cleaned gas turbine exhaust then is exhausted through the top of the absorber where it is directed through an exit stack to atmosphere.

REGENERATOR (also called a CO_2 Stripper): After absorbing the target design levels of CO_2 in the Absorber, the amine + captured CO_2 is heated via heat exchange with regenerated amine and enters the top of a Regenerator column. This is where CO_2 is stripped (or desorbed) from the amine-solvent through the addition of heat. A reboiler at the base of the Regenerator utilizes low pressure steam as the source of energy to vaporize water in the solvent. This steam (from the CCGT) provides the heat necessary to break the bond between the amine solvent and the dissolved CO_2. The regenerated amine solvent is cooled via heat exchange with amine + captured CO_2 and aerial cooling prior to being returned to the absorber once it is free of CO_2 in order to continue the absorption process cycle. A mixture of CO_2 and steam now stripped from the amine solvent exits the top of the Regenerator and is sent on to the compressor system.

COMPRESSOR: The Compressor component of the ICCF facility provides dehydration and compression of the CO_2. As part of this process, unwanted moisture and contaminants are removed to provide a high purity CO_2 product stream. Moisture is removed through a dehydration system as well as during the compression. The moisture is then collected and cycled back to the CO_2 Absorber. The compressor will be designed to pressurize the CO_2 to a level required by the CO_2 pipeline that will ship CO_2 from the site to the sequestration location.

ICCF Conceptual Block Flow Diagram (Figure 9.3): The plot plan shows a conceptual layout of the ICCF components. Additional detail is shown in the Block Flow Diagram in Figure 9.3. The ICCF will be sized to treat the entire exhaust gas volume of the CCGT.

The Block Flow Diagram outlines the major utilities and interface inlets and outlets associated with the ICCF. The ICCF requires demineralized water, auxiliary power, and process steam. These utilities will principally be provided from the CCGT.

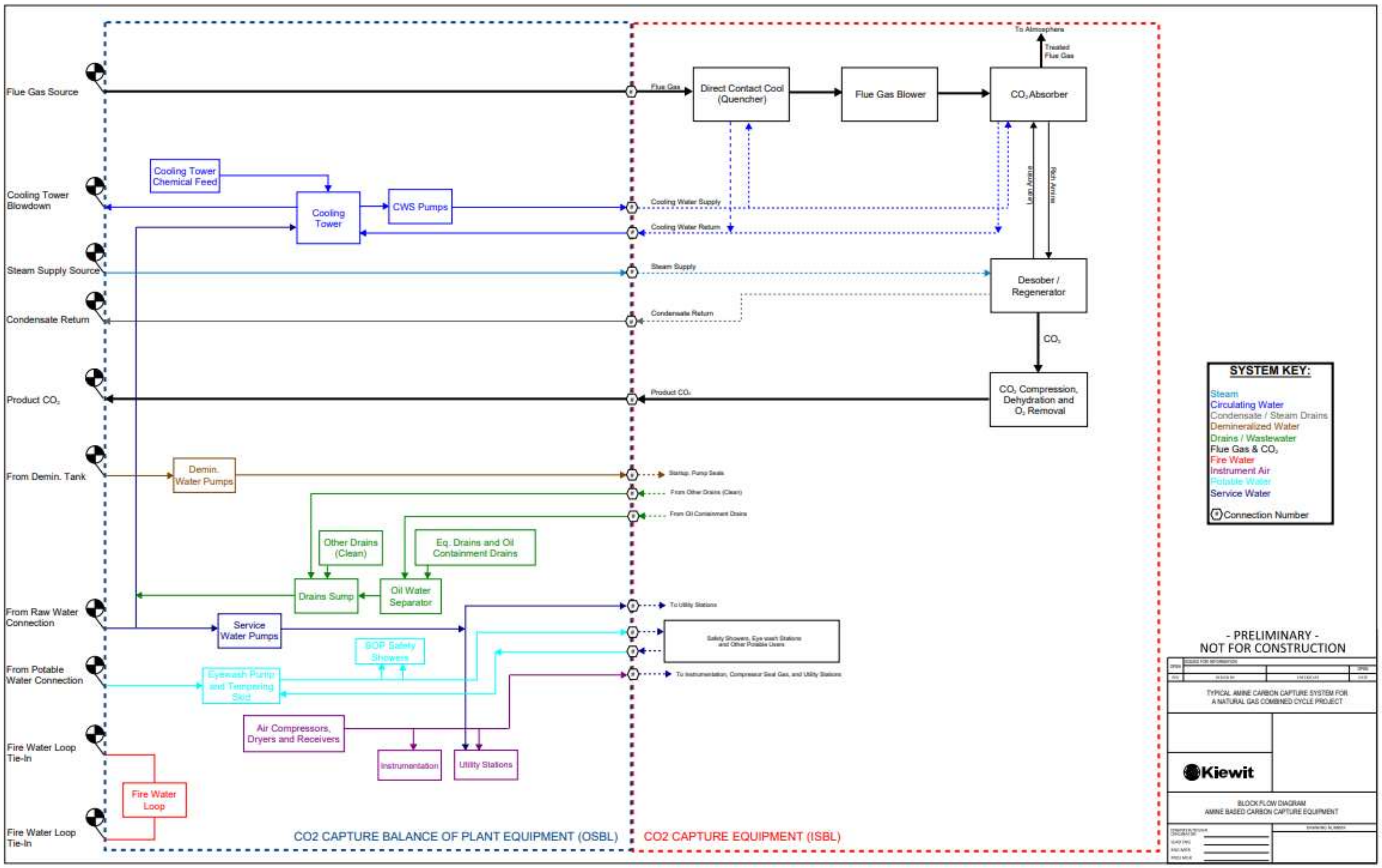
Exhaust Gas Ducting: Ductwork to conduct CCGT exhaust gas to the ICCF will likely be tied into the CCGT HRSG just prior to the outlet into the exhaust stack. It is expected that the CCGT exhaust gas will be routed from the CCGT tie-in point to the ICCF via elevated ductwork. Cleaned exhaust gas after CO_2 removal would exit the absorber vessel through a new stack located on top of the absorber or routed back to be integrated with the usual HRSG/exhaust stack configuration.

Plant Makeup Water: Optimization of water supply will continue through Project development. The scope of the PGF, presently, is based on water sourced from groundwater. A small quantity of process water would be required for operation of the ICCF for solvent regeneration or absorber water balance purposes. This water is expected to be drawn from the CCGT demineralized water makeup system. Full water capacity can be designed into the CCGT BOP demineralizer system to accommodate the ICCF. Water reuse will be optimized in the ICCF process, based on final design, to reduce the amount of plant makeup water where possible.

Cooling Water: The CO_2 capture equipment will include a separate, ACHE system dedicated to the ICCF. Water recovered from the gas turbine exhaust in the Quencher may be used as makeup and will set the sizing basis for the cooling process.

Process water: The ICCF will produce a process water stream consisting primarily of cooling system blowdown. Based on the cycles of concentration value of what would be treated in the PGF's process water treatment system. Water reuse will be optimized in the ICCF process, based on final design, to reduce the amount of process water from the ICCF, where possible.

Figure 9.3 ICCF Conceptual Block Flow Diagram



Steam for Regenerator: The regenerator sub-component of the ICCF requires low pressure steam to strip CO_2 from the solvent after the CO_2 absorber stage. Either intermediate pressure or low-pressure steam can be extracted from the steam turbine (in the CCGT) to support the regenerator operations. If intermediate pressure steam is used, then steam-driven compression may be considered during the final engineering stage. This could result in less auxiliary power demand and greater facility efficiency. After the steam condenses in the regenerator components reboiler, condensate would be cycled back to the CCGT's condensate system.

ICCF Power Needs: The CO_2 capture sub-components and BOP systems include many pumps, compressors, fans, and other components which result in auxiliary power consumption. The largest user of this power in the ICCF is the CO_2 compressor component. Electrical power for the ICCF will be supplied from the CCGT.

ICCF Solid Waste: As part of amine solvent-based systems, degraded amine solvent used for the carbon capture process will be filtered out and removed. Typically, collected amine solvent waste will be disposed of separately at an appropriate third-party facility.

9.1.2 Power Transmission Line and Interconnection

Based on studies conducted with the AESO, the PGF is expected to be connected to the AIES by a new 240 kV transmission interconnection. Several interconnection options were previously assessed for the Project, which resulted in identification of two proposed interconnection options, as follows:

- Add a 240 kV circuit, approximately 10 km in length, to connect the PGF to the existing 240 kV transmission line 9L938 (between the Sagitawah 77S switchyard and the Louise Creek 809S switchyard) using a T-tap configuration. This new 240 kV circuit would be located in a new right-of-way adjacent to the right-of-way of existing 240 kV circuit 907L.
- Add a 240 kV circuit, approximately 20 km in length to connect the PGF to the existing Sagitawah 77S switchyard using a radial configuration. This option includes upgrading the Sagitawah 77S switchyard by adding one 240 kV circuit breaker and adding or modifying associated equipment as required for the transmission development. This new 240 kV circuit would be installed in the same right of way as described in the option above for the first 10 km from the PGF; thereafter, the new circuit would likely be installed in an existing right-of-way to the Sagitawah 77S switchyard on a currently open side of existing double-circuit tower structures for this remaining 10 km, eliminating the need for both a new right-of-way and new tower structures for this 10 km portion of the new circuit.

The proposed routes for the above interconnection options are presented on Figure 1.1.

A connection study is underway by MIL and will be used by the AESO to make a decision based on transmission line capacity and needs assessment.

9.1.3 CO_2 pipeline

The CO_2 pipeline will run from the PGF to the CO_2 sequestration hub injection site currently proposed for north of Whitecourt, AB (approximately 12 km in length). While the pipeline routing is in development, it is anticipated to parallel existing disturbances to the extent possible, including existing natural gas pipeline rights-of-way (ROWs) and Highway 43. The CO_2 pipeline and the natural gas pipeline components of the Project are anticipated to be built parallel to each other to the extent possible. The pipeline will be regulated by the AER. See Figure 1.1 for the proposed route.

The CO_2 pipeline will be monitored during operation following AER's requirements for active pipelines. Additional design and operating processes will be implemented for safe operation of the CO_2 pipeline, including:

- CO_2 dehydration system at PGF ensures that water content in CO_2 is below levels where corrosion of the CO_2 pipeline would be a concern
- Ongoing pipeline integrity monitoring/corrosion protection
- Shut-in of pipeline if water dewpoint levels in CO_2 exceed allowable limits
- Line break valves on CO_2 pipeline ensure that if a rupture occurs, only the volume of CO_2 between line break valves is released (no continuous source of CO_2 into the release)

9.1.4 Natural Gas Pipeline

Natural gas will be provided by a new pipeline built as a component of the Project, to deliver up to 85,000 gigajoules per day (GJ/d) of sweet pipeline-specification natural gas from the NGTL network to the PGF (approximately 30 km in length). The natural gas pipeline is anticipated to originate at the existing NGTL Windfall Meter Station. The pipeline routing is in development; however, it is anticipated to parallel existing disturbances for the majority of the length of the pipeline route, including ROWs. The pipeline will be regulated by the Alberta Energy Regulator (AER). See Figure 1.1 for the proposed route.

The natural gas pipeline will be monitored during operations based on AER requirements for natural gas pipelines. Design and operating procedures for safe operation of the natural gas pipeline will include:

- Pipeline designed to be isolated in the event of a rupture such that only gas within the pipe itself would be released
- Pipeline integrity systems (inspections, corrosion control) will be implemented to minimize risk of pipeline failure
- Sweet natural gas, so upon release/ignition, no toxic gases are present

9.2 Ancillary Infrastructure

9.2.1 Water Supply

The maximum raw water use for the PGF is estimated to be 883 cubic metres per day (m^3/d) (162 US gpm). However, this estimate does not consider optimization and recycling of water streams produced in the ICCF Quencher sub-component. Quencher water production can be significant, and some of this water can be used to offset raw water supply needs when the PGF is fully operational. Other uses for the Quencher water production will be in some of the other sub-components of the ICCF. When in full operation, final raw water usage for the PGF is expected to be significantly reduced below 883 m^3/d (162 US gpm) through design coordination with the ICCF original equipment manufacturer (ICCF OEM).

Water supply for the PGF, presently, is expected to be sourced from groundwater wells installed near the PGF site. Desktop evaluation of the on-site aquifer potential is limited, but based on existing information groundwater yields are expected to be in the range of 218 m^3/d (40 US gpm) based on ethe existing diversion licence granted to the current pit operator for washing water. This constitutes approximately a quarter of the overall system requirements of approximately 872 m^3/d (160 US gpm). Offsite groundwater exploration/development is necessary to obtain the water requirements via a groundwater source well or wells. Preliminary analysis of the region indicates that there is significant aquifer potential near the PGF, particularly in the floodplain areas downstream (south and east) of the PGF. Further discussion on the potential effects of the Project on groundwater are below in Section 19.4.

9.2.2 Ancillary Roads and Utilities

Access to the PGF will be from the exiting Alberta Highway 43 connection to the industrial area roadways that bounds the proposed facility site to the west and north.

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

The proposed CO_2 pipeline will carry CO_2 to the proposed third-party Athabasca Banks facility, which is an independent development and is not part of the Project.

9.3 Description of Project Activities

Project construction, operation and decommissioning are discussed below.

9.3.1 Construction

Pre-construction geotechnical investigation will be required to obtain surface and subsurface information for foundation design. Construction activities will include clearing vegetation, access road construction, surface preparations, installation of major equipment, connection of process and ancillary equipment, site drainage and erosion control, and site clean-up and restoration. Areas where soil has not been cleared from previous site use activities, will have such soil excavated and stored on site for restoration upon decommissioning of the Project.

Initial activities involve survey and demarcation of PGF site layout, followed by surface preparation. Site preparation is expected to take approximately four to five months to complete. The general sequence of the site preparation will be to commence with the main PGF area and the construction of the management trailer area/laydown areas. The first step of site preparation involves levelling the site area to a predetermined site grade. This involves either cutting or filling the area depending on the pre-existing elevations of the landscape. The soil that is cleared will be stored on site. The balance of site preparation includes installing the site fence, installing the surface water management pond, and installing the access roads on the site. This will be followed by foundation excavation and construction which includes excavation, piling construction and foundation/substructures construction. Duct bank and grounding grid construction and underground piping installation work will be completed during the construction of the foundations in the same area. Building construction and equipment installation will begin following the completion of foundation construction. Building construction includes mechanical, electrical and switchyard construction. The major equipment will be connected by piping and cables for eventual operation. The ACC, HRSG, and Carbon Capture Equipment will conclude the mechanical installation. The bulk of electrical installation will be done in parallel to the late stages of mechanical erection. The principal activities involved in commissioning of the Project include start-up planning and preparation, the start-up and commissioning process, start-up and commissioning management, operator training management, and performance testing.

Cleanup activities will be ongoing throughout construction. Following construction, waste materials will be removed, stored soil replaced on areas not covered by asphalt or structures and then the area will be revegetated. Construction waste will be collected and disposed of at licensed waste facilities.

9.3.2 Operation

The Project will be owned by MIL and operated by an experienced third-party operator. Day to day operation and maintenance will be provided by a staff of operators, engineers and support staff totaling approximately 32 persons.

The turbine and generator manufacturer will provide major maintenance and inspection work.

The CCGT will combust natural gas to produce power in a gas turbine which can be converted to electrical power by a coupled generator. The hot exhaust gases from the gas turbine are used to produce steam in a HRSG. This steam is supplied to the steam turbine generator to produce additional power. As a result, combined cycle facilities are one of the most efficient and reliable generation technologies available.

The ICCF will remove (capture) CO_2 from the CCGT exhaust stream, and thereby greatly reduce CO_2 emissions from the CCGT. To date, amine-based CO_2 capture is the most developed commercial technology available on a large, combined cycle power plant scale. Of the available options, amine solvent-based absorption technologies have been demonstrated as technically feasible and have been fully implemented in large-scale coal-fired applications at both the Petra Nova and Boundary Dam facilities. Starting in January 2017, Petra Nova operated successfully with an amine carbon capture technology. Boundary Dam has been operating since the fall of 2014. Both facilities were designed to reduce CO_2 emissions in their exhaust gas turbine exhaust by approximately 90% and have achieved or exceeded this level of CO_2 removal. Since the commercial operation of these facilities, amine-based technologies have improved in their performance, including higher capture rates and lower utility requirements. Currently, projects are expected to demonstrate a 90% capture efficiency, and major amine capture technology providers are advising that 95% capture rates are achievable. These technologies are now feasible for natural gas-fired applications like the Project.

9.3.3 Decommissioning and Abandonment

The Project is expected to operate for approximately 40 years. Precise timing for the decommissioning of the PGF site cannot be predicted at this time. However, all relevant environmental regulations in existence at the time of decommissioning will be adhered to. A Decommissioning and Reclamation Plan will be developed for the Project prior to PGF site closure and will include habitat restoration in the Project Area.

9.3.4 Accidents and Malfunctions

MIL will incorporate monitoring, safety and response measures into the design of the Project; details on some of these key features are provided above in Section 9.1. In addition, MIL will develop a site-specific emergency management plan that incorporates all aspects of the Project, including the PGF, natural gas and CO_2 pipelines and transmission line and associated infrastructure. This plan will be developed prior to construction of the Project and will address construction, operation and decommissioning phases and will follow similar emergency management plans implemented by existing power plant plants that are owned by subsidiaries of the General Electric Company, MIL's parent company. The emergency management plan will also conform with conditions included in the EPEA and AUC approvals, as well as AER requirements, including:

- Directive 050: Storage Requirements for the Upstream Petroleum Industry
- Directive 071: Emergency Preparedness and Response
- Directive 056: Energy Development Applications and Schedules

Below is a list of potential high consequence accidents or malfunctions that could interrupt operations at the PGF, the natural gas and CO_2 pipelines and transmission line. Mitigation measures to reduce the potential effects are also provided.

- Pipeline rupture, material release, explosion, and fire
  - Pipelines will be designed to be isolated in the event a rupture were to occur
  - Integrity systems will be implemented to limit the risk of pipeline failure
  - CO_2 dehydration system will be installed at the PGF to reduce water content below levels where corrosion of the pipeline could be a concern
- Fire, explosion or material release at the PGF
  - Fire suppression units will be part of the PGF; chemicals will be stored in areas with secondary containment and in accordance to safety processes; volumes of chemicals will be limited
  - Site drains will include oil and grit separators with shutoff systems
  - Monitoring systems will be in place to regulate pressures and operating parameters

- Transmission line connection and electrical issues
  - proper insulation/configuration design of the transmission line
  - RoW maintenance will be done including regular brush clearing to maintain design clearances

The measures described above are in addition to the Project's adherence to all governing power industry codes and standards. Furthermore, where no formal standards exist, engineering and operation of all Project components will at a minimum be in accordance with prudent industry practices.

10 Estimated Maximum Project Capacity

Electricity production will be from the combined-cycle gas turbine using sweet natural gas. The CCGT will generate up to 465 MW of electricity for delivery to the AIES.

The ICCF will capture up to approximately 4,000 tonnes/d of CO_2. This CO_2 will be transported by pipeline to a third-party regional CO_2 sequestration hub facility for permanent storage.

11 Project Schedule

The anticipated Project schedule is presented in Table 11.1, below.

Table 11-1 Project Schedule

Date	Project Phase
Q2 and Q3 2023	Field surveys and technical studies
Q4 2023 thru Q4 2024	Permits and approval applications
Q4 2023 thru Q3 2024	Preliminary engineering
Q4 2024	Construction start
Q3 2027	Start up / commissioning
Q1 2028	In service
> 2068	Project decommissioning (after estimated 40-year life)

12 Project Alternatives

12.1 Alternative Means of Carrying Out the Project

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

- Facility siting
- Power transmission and pipeline routing
- Selection of gas-fired combined cycle power generation technology – configuration and sizing
- Selection of post-combustion CO2 capture process technology
- Alternatives to meet Project cooling duties – water vs air

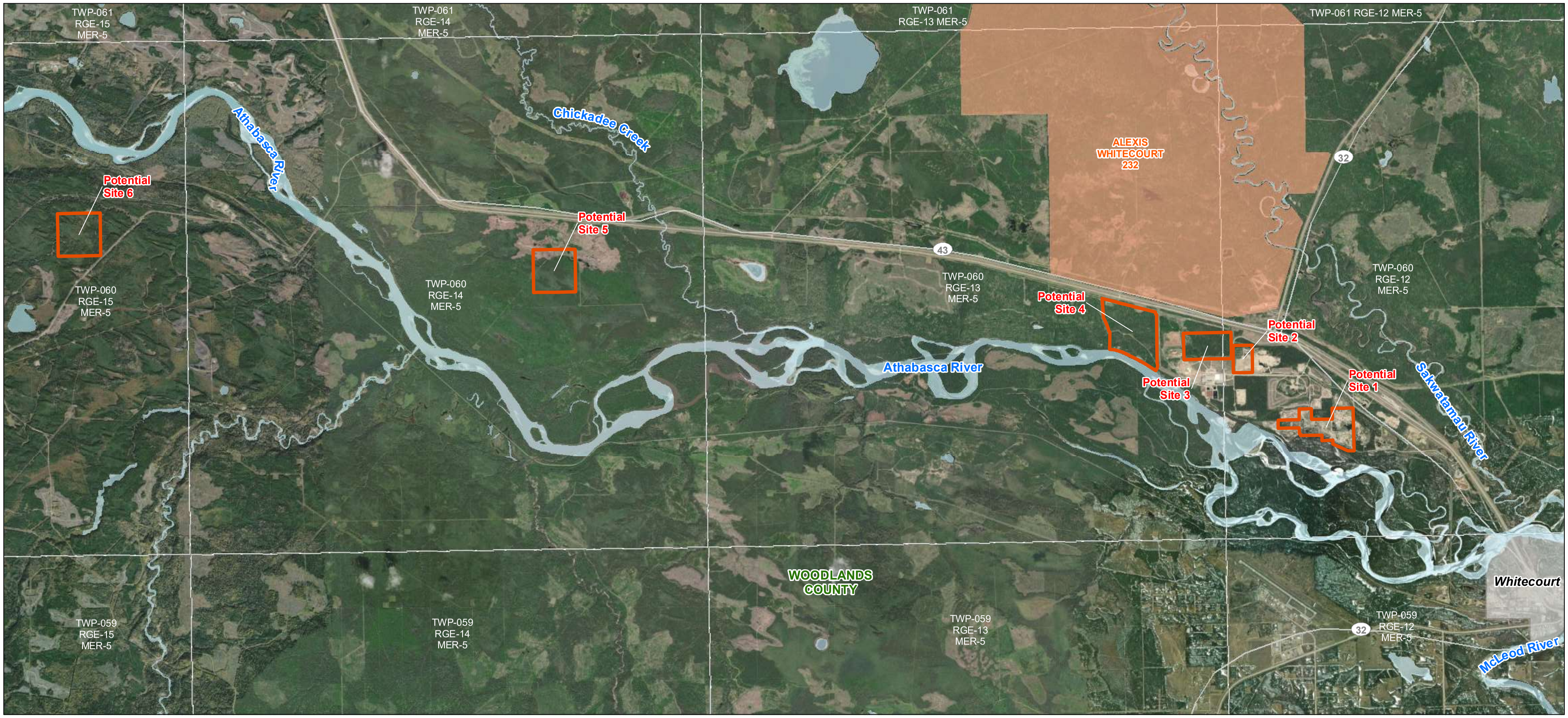
12.1.1 Facility Siting

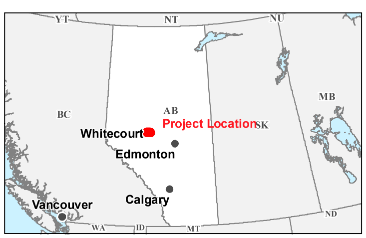
MIL evaluated several other potential sites to develop the Project, but based on its initial screening analysis, concluded that the selected area for the PCF best served its purpose. All sites considered offer proximity to required off-site infrastructure, including electric and gas interconnections; potential water resources; and importantly, a suitable destination for the captured CO_2. Given federal and provincial goals to achieve a net-zero electricity grid, CO_2 capture, and sequestration are necessary features to achieve a low-carbon intensity power generation.

MIL considered six potential sites in north-central Alberta for the PGF. All potential PGF sites, as shown in Figure 12.1, are located within Woodlands County, near Whitecourt, and were referred to by either the existing development or nearest waterbody as provided in Table 12.1.

Table 12-1 Potential Facility Sites Evaluated

Potential Site	Legal Subdivision (LSD)
1	SE-07-60-12 W5M and SW-08-60-12 W5M
2	SW-18-60-12 W5M and NW-7-60-12 W5M
3	SE-13-60-13 W5M and SW-18-60-12 W5M
4	NE-14-60-13 W5M, SW-13-60-13 W5M, NW-12-60-13 W5M, NW-13-60-13 W5M, and SE-14-60-13 W5M
5	SW-23-60-14 W5M
6	NE-23-60-15 W5M





Study Area
Major Road
First Nation Reserve
Township
Urban Area
Waterbody

0 0.5 1 1.5 2 Kilometres
(At original document size of 11x17)
1:75,000

N

Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Government of Alberta and Canada, Stantec and General Electric
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Stantec

Project Location
Whitecourt,
Alberta

Prepared by DS on 2022-01-20
TR by SM on 2022-01-20
IR Review by JD on 2022-01-20

Client/Project
110220760-024 REVA
Client: Moraine Initiatives Limited
Project: Moraine Power Generation Project
Detailed Project Description

Figure No.
12.1

Title
Potential Sites Overview

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Sites 1 and 2 are previously developed (referred to as brownfield sites), and sites 3 through 6 are currently largely undeveloped.

An environmental opportunities and constraints analysis was carried out for the potential sites (Stantec 2022).

The potential sites for the PGF were evaluated in terms of effects and benefits to the following environmental components:

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

The results of the opportunities and constraints analysis are summarized Table 12.1. Based on the evaluation rankings, the site most favorable for development was site 2. It is a relatively flat site located in an area zoned for industrial activities and is 10 km of Whitecourt. There are few anticipated interactions with forested land, wetlands, fish and fish habitat, and wildlife and wildlife habitat associated with site 2 because it is already largely disturbed.

Following site 2, sites 1 and 3 were evaluated as the next best sites for development. Site 1 was very similar to site 2, but scored lower mainly due to potential for flooding, as well as potential interactions with fish and fish habitat, vegetation and wetlands, and wildlife and wildlife habitat. Site 1 had higher wildlife habitat values because the site is partially undeveloped, and is contiguous with the Athabasca River valley, and contains an unnamed watercourse and tributary to the Athabasca River that could provide habitat to fish species at risk. Land use, access, and topography were ranked similar to site 2. Hydrogeology characteristics of site 1 pose the same opportunities and constraints as site 2.

Site 3 scored lower than site 2, but roughly equivalent to site 1. Like site 1, site 3 is partially forested, although site 3 is more intact. As such, constraints related to potential interactions with vegetation and wetlands, and wildlife and wildlife habitat reduced the evaluation ranking at site 3. Access and topography at site 3 do not pose an obstacle to development. Site 3 has an existing Public Lands disposition for a permanent silvicultural sample plot, ISP980011, which covers 10.09 ha of the site 3 parcel which amounts to approximately 22% of the total site area. The importance of this disposition as a potential obstacle to development is not fully understood and will require further investigation should this site be selected for development.

The site 4 evaluation indicates that there are constraints to development at this site that exceed those identified for sites1 to 3 but are roughly equivalent to site 5. This is mainly due to the Public Land dispositions on the site, steep topography that would require substantial grading prior to construction, the presence of an unnamed stream, and wildlife habitat values related to forested habitats and wetlands. The entire site 4 is under a consultative notation disposition, and approximately 36% of the site area is under a disposition for a recreational lease. The importance of this disposition as a potential obstacle to development is not fully understood and would require further investigation if the site was selected for development. Site 4 is largely intact forested and wetland habitats that could support wildlife species at risk and falls within a key wildlife biodiversity zone (KWBZ) designated area meant to protect biodiversity and ungulate winter range. The evaluation ranking considered the need for water intake infrastructure on the Athabasca River as a constraint that would require additional permitting for interactions with fish and fish habitat. Additional mitigation would be required for works proximate to the unnamed stream within the site boundaries. Restricted activity periods for activities instream, and for activities related to clearing vegetation (i.e., migratory birds and roosting endangered bats) were considered as constraints that would require additional approvals and potentially increased costs related to mitigation. The hydrogeological constraints at site 4 are low potential for groundwater yields, and conversely a low potential for dewatering and water management, particularly during construction. Given variability in geological conditions, a test-hole and pumping test program to validate aquifer potential would be required in specific portions of the site. This is applicable to site 4 and all other sites as well.

There are constraints to development at site 5 that exceed those identified for the sites 1 to 3. This is mainly due to wildlife habitat values at the site, and an abundance of wetlands that may be costly to develop, due to compensation, along with topography and terrain that would require grading prior to construction. Site 5 is largely intact forested and wetland habitats that could support wildlife species at risk and falls within a KWBZ designated area meant to protect biodiversity and ungulate winter range. The evaluation ranking considered the need for water intake infrastructure on the Athabasca River as a constraint that would require additional permitting for interactions with fish and fish habitat. Restricted activity periods for activities instream, and for activities related to clearing vegetation (i.e., migratory birds and roosting endangered bats) were considered as constraints that would require additional approvals and potentially increased costs related to mitigation. The hydrogeological constraints at site 5 are low potential for groundwater yields, and conversely a low potential for dewatering and water management, particularly during construction.

Site 6 had the lowest evaluation ranking of all the sites. Similar to site 5, habitat values were high including an abundance of wetland habitat that may be costly to develop, along with topography and terrain that would require grading prior to construction. The primary difference in the evaluation ranking between sites 6 and 5 is the existing Public Lands disposition for a permanent silviculture research plot, and the historical resources (HRV) designation which could result in a requirement for Indigenous engagement. Site 6 is largely intact forested and wetland habitats that could support wildlife species at risk, and the water intake infrastructure falls within a KWBZ designated area meant to protect biodiversity and ungulate winter range. The evaluation ranking considered the need for water intake infrastructure on the Athabasca River as a constraint that would require additional permitting for interactions with fish and fish habitat, including the crossing of an unnamed Class C stream, and two rail line crossings. Restricted activity periods for activities instream, and for activities related to clearing vegetation (i.e., migratory birds and roosting endangered bats) were considered as constraints that would require additional approvals and potentially increased costs related to mitigation. The hydrogeological constraints at site 6 further reduced the evaluation ranking due to the prevalence of wetland habitat potentially limiting development area to upland areas.

Table 12-2 Evaluation Rankings of Opportunities and Constraints for Six Potential Sites

Component	Evaluation Ranking 1	2	3	4	5	6
Historic & Current Land Use	Good	Good	Fair	Fair (recreational lease)	Good	Fair
Access	Very Good	Very Good	Very Good	Good	Good	Good
Topography and Terrain	Good	Good	Good	Fair (due to slope requiring grading)	Fair (due to slope requiring grading)	Fair (due to slope requiring grading)
Hydrogeology	Fair	Fair	Fair	Good	Good	Fair
Fish and Fish Habitat	Good	Very Good	Very Good	Good	Good	Good
Vegetation and Wetlands	Good	Very Good	Fair (due to some wetland area to be avoided, mitigated or replaced)	Fair (due to some wetland area to be avoided, mitigated or replaced)	Poor (due to the large amount of wetland area to be avoided, mitigated or replaced)	Poor (due to the large amount of wetland area to be avoided, mitigated or replaced)
Wildlife and Wildlife Habitat	Good	Very Good	Good	Fair	Fair	Fair
Historic Resources	Very Good	Very Good	Very Good	Very Good	Very Good	Good

Suitability Ranking	Definition
Excellent	No challenges, constraints, impacts and/or risks identified during the evaluation
Very Good	Select challenges, constraints, impacts and/or risks identified during the evaluation, however, these could be easily be avoided, reduced, controlled and/or resolved
Good	Select challenges, constraints, impacts and/or risks identified during the evaluation and with some effort, could be avoided, reduced, controlled and/or resolved
Fair	A number of challenges, constraints, impacts and/or risks identified during the evaluation but with some effort, could be avoided, reduced, controlled and/or resolved
Poor	A number of challenges, constraints, impacts and/or risks identified during the evaluation which could not be easily avoided, reduced, controlled and/or resolved
Unable to evaluate	Ranking cannot be determined due to lack of information.

MIL has chosen the site 2 for the Project location. Environmental studies and engineering design of the site is ongoing.

After the above evaluation was completed, MIL gave some consideration to siting the Project on the Alexis Nakota Sioux Nation reserve land; however, it was concluded that the timeline to obtain approvals to comply with the *First Nations Commercial and Industrial Development Act* were not feasible for the Project's schedule.

12.1.2 Power Transmission Line and Pipeline Routing

Project planning is ongoing, including refined routing for the power transmission line, natural gas pipeline and CO_2 pipeline. Inputs to route refinement include considerations of safety, constructability, cost, land use, environment, and stakeholder input. Wherever possible, the selected pipeline and power transmission routes will parallel existing disturbances (e.g., existing pipeline ROWs, transmission lines, roads), which helps to reduce potential environmental and socio-economic effects by reducing the area of new disturbance and potential fragmentation. Of particular interest are potential impacts of routing on key environmental features including the Athabasca River, as well as on existing infrastructure such as Highway 43, the Town of Whitecourt, and nearby Indigenous communities.

12.1.3 Combined Cycle Power Generation Technology

For dispatchable baseload natural gas-fired power generation, CCGT configurations offer the best available technical and economic solutions, considering installed capital cost, operating costs, and plant efficiency. CCGT consist of both a combustion gas turbine generator and a steam turbine generator, where the steam for the steam turbine generator is raised from the heat contained in the combustion gas turbine generator exhaust gases.

Multiple combined cycle plant sizes and configurations were evaluated both technically and economically, for use in the Project. Among the alternatives evaluated, the multi shaft H-Class configuration, using the General Electric 7HA combustion gas turbine generator, offered the best technical and economic solution, with superior economy-of-scale (installed cost) and efficiencies.

12.1.4 Post-Combustion CO_2 Capture

There are several technologies capable of removing CO_2 from natural gas-fired power generation plant exhaust (i.e., post-combustion CO_2 capture, or PCCC), such as membranes, solid and liquid absorbents, and freezing/phase-change precipitation. However, among this range of technologies, only the amine-based regenerative liquid absorbent process has been technically and economically proven in commercial applications at a scale similar to, or larger than, that of the Project.

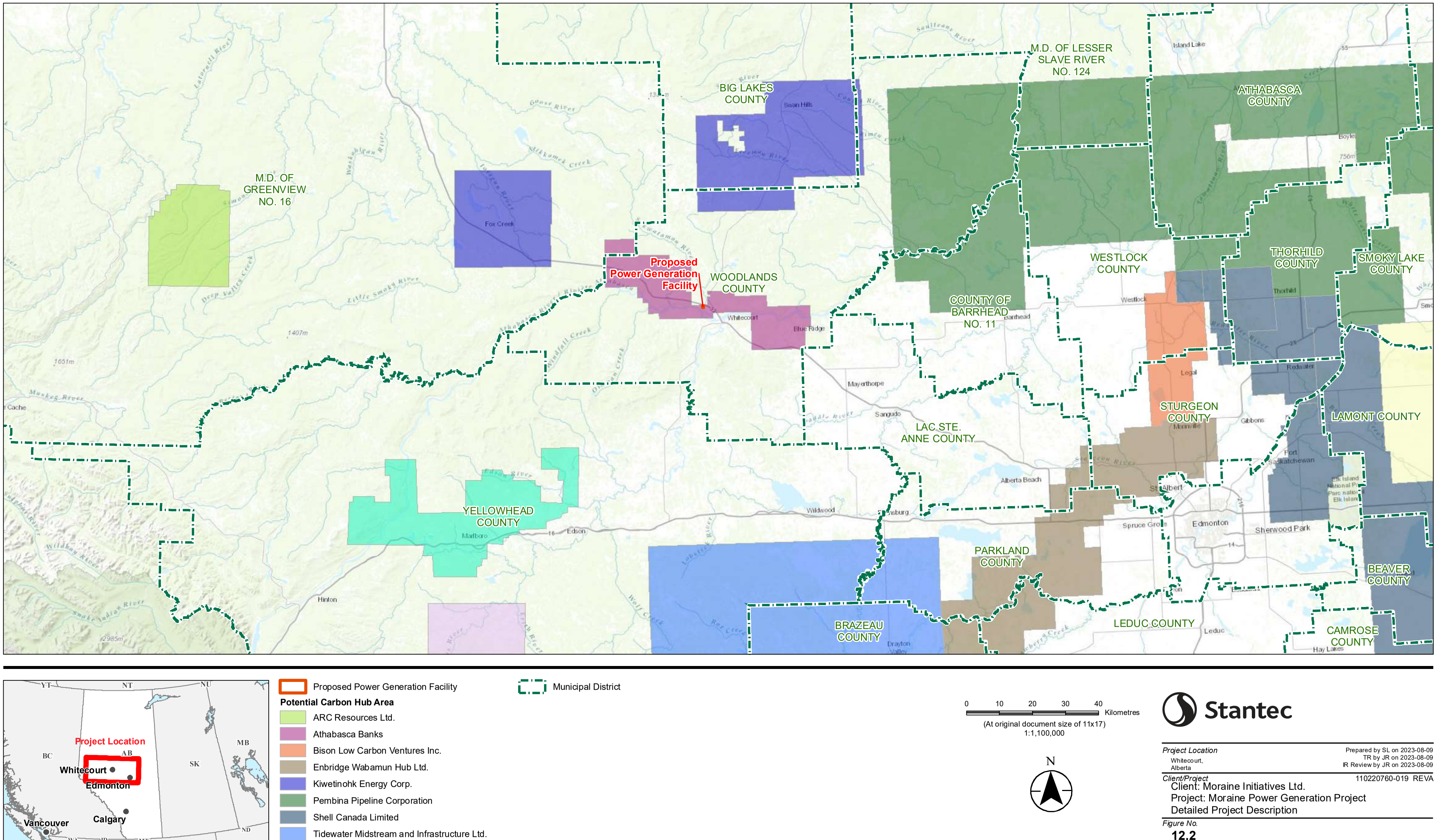
Thus, the Project will incorporate an amine-based ICCF unit to remove up to 95% of the CO_2 from the gas turbine exhaust stream, as the best technically and economically feasible process for the Project.

Amine-based CO_2 (and more generally, acid gas, or CO_2 and hydrogen sulfide [H_2S]) removal units have been widely used in Western Canada in the processing of natural gas since the mid-20th century. Thus, there are several decades worth of design, construction, and operating experience across many dozens of amine-based gas processing units in Western Canada. The amine process to be used in the Project is very similar to that of these natural gas treating applications.

12.1.4.1 Alternative Carbon Storage Hubs

MIL is planning to transport the captured CO_2 to a third-party CO_2 sequestration hub storage project. The Athabasca Banks Carbon Hub was selected by the Government of Alberta as one of 25 hub projects located across Alberta, to provide open access for the sequestration of CO_2 and is the preferred third-party hub for the Project. The hub projects were selected based on proposals submitted to the Government of Alberta. Once selected, each hub proponent is required to enter into an evaluation agreement with the province to further explore the project area's ability to safely store CO_2. Companies will be required to demonstrate the viability of the sequestration lease to safely and permanently store CO_2, and subsequently apply for the right to inject captured CO_2. A cornerstone of the hub model is that each project must provide open access to potentially allow for CO_2 emissions from multiple industrial sources be stored in a single CO_2 sequestration area. This model means that the Athabasca Banks Carbon Hub Project can develop independently and work to store other industrial sources in the region. If Athabasca Banks Carbon Hub is determined to not be viable, or does not proceed for any reason, MIL can consider other potential hubs to sequester its CO_2.

At present, there are several other hubs under development within 100 km of the Project for consideration. Availability of alternative CO_2 sequestration hubs that could be used for storage of the CO_2 have been identified in Figure 12.2 below.



Proposed Power Generation Facility

Municipal District

Potential Carbon Hub Area

- ARC Resources Ltd.
- Athabasca Banks
- Bison Low Carbon Ventures Inc.
- Enbridge Wabamun Hub Ltd.
- Kiwetinohk Energy Corp.
- Pembina Pipeline Corporation
- Shell Canada Limited
- Tidewater Midstream and Infrastructure Ltd.
- Tourmaline Oil Corp.
- Vault 44.01 Ltd.
- Wolf Carbon Hub GP Inc

0 10 20 30 40 Kilometres
(At original document size of 11x17)
1:1,100,000

N

Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Government of Alberta and Canada, Stantec and General Electric
3. Background: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Stantec

Project Location
Whitecourt, Alberta

Prepared by SL on 2023-08-09
TR by JR on 2023-08-09
IR Review by JR on 2023-08-09

Client/Project
110220760-019 REVA
Client: Moraine Initiatives Ltd.
Project: Moraine Power Generation Project
Detailed Project Description

Figure No.
12.2

Title
Alternate Carbon Storage Hub Locations Near the Project

W:\Clients\General_Electric\Sagitawah_Cogen\Figures\DetailedProjectDescription\110220760_019_CarbonHubAreas.mxd Revised: 2023-08-25 By: slemay

12.1.5 Cooling

Various process steps and equipment in the PGF require cooling, which is provided by heat exchange with either air or cooling water.

In air or aerial cooling, ambient air is blown through heat exchangers, and heat is transferred from the process to the air.

In water-based cooling, water is circulated through heat exchangers, and heat is transferred to the water as a result. This warm water is typically routed to a cooling tower, where the evaporation of most of the water cools the rest, which is then recirculated back through the Project.

For the PGF, air cooling has been chosen to provide the principal cooling duties. Air cooling offers significant environmental advantages relative to water-based cooling:

- No need for a large-scale source of makeup water, as is the case in a water-based system, to compensate for water evaporated or otherwise removed from the cooling water circuit
- No need for large-scale water supply infrastructure (e.g., a river water intake facility, with its attendant impacts on the riparian environment, principally during construction)
- No need for a large make-up water storage pond to ensure that adequate quantities of surplus water are available in the event of limitations on withdrawing river water

12.2 Alternative to the Project

Based on Moraine's estimates, we believe the cost of power from the proposed combined-cycle with integrated carbon capture that generates baseload, near-zero emission power compliant with Canada's recently proposed Clean Electricity Regulations would be competitive with the cost of renewable generation (wind or solar) after taking into account the additional, significant cost of firming-up the such non-emitting but intermittent generation resources with battery or other energy storage technologies to meet the high load factor energy demand from Alberta's industrial, commercial and residential users, which will only increase with further electrification of the economy.

Part C: Location Information and Context

13 Geographic Information

The PGF is located at NW-7-60-12-W5 and SW-18-60-12-W5; Latitude 54°10' 55" N (54.181944) Longitude 115°47'46" W (-115.796111) and all three linear components will start at this geographical location.

The CO_2 pipeline will run from the PGF to the CO_2 sequestration hub injection site (approximately at Latitude 54°14' 27" N (54.241081) Longitude 116°0'2" W (-116.000724)) currently proposed for north of Whitecourt, AB (approximately 18 km in length). The pipeline routing is in development; however, it is anticipated to parallel existing disturbances, including existing pipeline ROWs and Highway 43, for the majority of the route.

Natural gas will be provided by a pipeline from the NGTL network to the PGF (approximately 30 km in length). The natural gas pipeline is anticipated to originate at the NGTL Windfall Meter Station, located at NW8-60-15 W5M; Latitude 54°10' 50" N (54.18051) and Longitude 116°12'58" W (-116.215414). The pipeline routing is in development; however, it is anticipated to parallel existing disturbances, including existing pipeline ROWs and Highway 43, for all of the total 30 km length.

The PGF will be connected to the AIES by a new 240 kV transmission interconnection. Two options are being explored, as follows:

- Adding a 240 kV circuit, approximately 10 km in length, to connect the PGF to the existing 240 kV transmission line 9L938 at approximately Latitude 54°10' 38" N (54.177329), Longitude 115°35'34" W (-115.592992). This new 240 kV circuit would be located in a new right-of-way adjacent to the right-of-way of the existing 240 kV circuit 907L.
- Adding a 240 kV circuit, approximately 20 km in length to connect the PGF to the existing Sagitawah 77S switchyard located at Latitude 54°4' 58" N (54.082816), Longitude 115°34'30" W (-115.575013). This new 240 kV circuit would be installed in the same right of way as described in the option above for the first 10 km from the PGF; thereafter, the new circuit would likely be installed in an existing right-of-way to the Sagitawah 77S switchyard on a currently open side of existing double-circuit tower structures for this remaining 10 km, eliminating the need for both a new right-of-way and new tower structures for this 10 km portion of the new circuit.

The Project's location, proposed pipeline routes, and transmission line routes are shown in Figure 1.1.

The PGF location is zoned by Woodlands County as *Natural Resources Extraction – Direct Control*., within an area used by the County for industrial development. The location is a brownfield site that currently serves as a gravel pit for aggregate extraction and processing and is Alberta Crown land currently leased by another company. Straight line distances to the nearest recreational facility includes the Eagle River Casino and Travel Plaza 1 km northeast of the PGF and 1.3 km to the Eagle River Tourism RV Park (RV Park), all of which are located on the Alexis Sioux Nation reserve lands. The

Whitecourt Airport is approximately 4 km south of the PGF and there are rural residences adjacent to the airport also approximately 4 km south-southwest of the PGF which are the closest residences to the PGF. The Town of Whitecourt is approximately 6.8 km southeast of the PGF.

The Project will be located on provincial public land and will not overlap any federally owned lands. The Project is proximal to Indigenous nations and organizations, as shown in Figure 4.1, and distances to nearby reserve lands is provided in Table 4.1. Traditional land uses by Indigenous nations will be confirmed during engagement (see Section 4); however, it is anticipated that the linear Project components will overlap areas that may have been or continue to be used for traditional practices based on baseline settings of the regional location and wildlife use. As the PGF is within an area that is currently zoned for industrial use and has been cleared, the use of this area would not be considered for traditional practices.

The nearest federally owned lands that are the closest to the Project include Jasper National Park (approximately 170 km) and Canadian Forces base (CFB) Edmonton Garrison (approximately 160 km).

14 Physical Environment

14.1 Project Environmental Setting

14.1.1 Setting

The Project is located in the Upper Athabasca Planning region, a region that starts at the upper reaches of the Athabasca River from the Columbia Icefield in Jasper National Park, centred largely along the Athabasca River, into Athabasca County towards the northeastern part of the province. The Town of Whitecourt is approximately in the centre of the planning region and is located on the eastern border of the foothills of the Rocky Mountains, in a valley at the confluence of the Athabasca River, the McLeod River, the Sakwatamau River, and Beaver Creek. The area has historically been used by many Indigenous nations, and the area was named "Sagitawah – the place where the rivers meet" by the Woodland Cree Nation (Town of Whitecourt). The rivers in the area were used for transportation and sustenance for early residents and has continued to be historically supported by the softwood lumber sector, although the western portion of the region also supports the coal mining sector.

The landscape is dominated by rolling hills of the Lower Foothills and Central Mixedwood Natural Subregions of Alberta (Natural Regions Committee 2006). The Lower Foothills Natural Subregion has the most diverse forests in the province in terms of forest type and tree species (Natural Regions Committee 2006). Wetlands cover approximately 35% of the Lower Foothills Subregion. The Central Mixedwood Subregion is a mosaic of aspen (*Populus tremuloides*), jack pine (*Pinus banksiana*), white spruce (*Picea glauca*), and mixedwood uplands with extensive areas of conifer-dominated treed fens and organic soils. Almost half the area in the subregion is comprised of wetlands with poorly drained fens and bogs being the most common types. A large part of the Central Mixedwood Natural Subregion has been converted to agricultural, residential, and industrial use, mainly towards the central part of the province.

14.1.2 Air Quality

The PGF is proposed to be located at site 2, a brownfield site located at SW 18-60-12-W5M & NW 7-60-12-W5M in Woodlands County near Whitecourt, AB. The Project is located in a rural area with few nearby industrial emission sources other than the adjacent Alberta Newsprint Company (ANC) facility. The ANC facility is an operating thermomechanical pulp and newsprint mill and is a source of combustion emissions associated with paper production and a natural gas-fired peaking electricity generation facility. The combined effects of the ANC facility and the Project are evaluated in Section 19.2.

The Project is located within the West Central Airshed Society (WCAS), a multi-stakeholder, not-for-profit organization responsible for collecting and sharing air quality monitoring data information on ambient air quality. The WCAS includes 12 continuous ambient air quality monitoring stations that measure a wide range of substances near both industrial facilities and communities. The 2021 WCAS annual report (WCAS 2022) indicates that most of the time, air quality was good, or "low risk" at all the monitoring stations. Monitoring stations located in Drayton Valley, Edson, Genesee, Hinton, Steeper, and Tomahawk collected a total of 51,251 hours of Air Quality Health Index (AQHI) measurements in 2021. Aside from the wildfires in July, the AQHI values in 2021 had over 95% of the recorded hours occurring in the low-risk range, with approximately 4% in moderate range, and less than 1% in high range.

Representative baseline ambient air quality concentrations for the air quality study area were determined based on analysis of regional ambient air quality monitoring data. There are no monitoring stations located in or near Whitecourt. Three years of measured nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter 2.5 microns or less in diameter ($PM_{2.5}$) concentrations from the Edson air quality monitoring station located 75 km southwest of the Project were used to determine baseline. Measured concentrations for carbon monoxide (CO) were obtained from the Fort Saskatchewan monitoring station located 175 km east-southeast of the Project which is the closest monitoring station with CO measurements. The ambient monitoring data from Edson and Fort Saskatchewan stations for the most recent three years (2019-2021) with complete data record (at least 75% complete) was analyzed to determine representative baseline concentrations following the calculation methodology in the Air Quality Model Guideline (AQMG; Alberta Environment and Parks [AEP] 2021a). For SO_2, the years 2018 and 2020 to 2021 were used as the measurements in 2019 appear anomalously low. The representative baseline concentrations used for the assessment of the Plant emissions are summarized in Table 14.1 and compared to the Alberta Ambient Air Quality Objectives/Guidelines (AAAQO/G). The baseline NO_2 concentrations are less than 22% of the AAAQO. The baseline SO_2 and CO concentrations are less than 3% of the AAAQO. The 1-hour average baseline PM2.5 concentration is 9% of the AAAQG and the 24-hour $PM_{2.5}$ baseline concentration is 23% of the AAAQO.

Table 14-1 Baseline Air Quality Concentrations

Station	Years	Substance	Averaging Period	Ambient Background Concentrations [a] ($\mu g/m^3$)	AAAQO ($\mu g/m^3$)	Comparison of Background to AAAQO (%)
Edson	2019-2021	NO_2	1-hour	35.6	300	11.9
			Annual	9.8	45	21.8
	2019-2021	$PM_{2.5}$	1-hour	7.0	80	8.8
			24-hour	6.6	29	22.8
	2018, 2020-2021	SO_2	1-hour	2.2	450	0.5
			24-hour	2.0	125	1.6
			30-day	0.8	30	2.8
			Annual	0.5	20	2.6
Fort Sask	2019-2021	CO	1-hour	365	15,000	2.4
			24-hour	364	6,000	6.1

NOTE:

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

14.1.3 Geology and Hydrogeology

The proposed PGF site overlies the Scollard Formation as the sub-cropping (i.e., uppermost) bedrock unit below the unconsolidated sediment of eolian sands. The groundwater yield capacity at the site is mapped at 10 – 136 m^3/d (5 – 25 US gpm) (Tokarsky 1977) and is assumed to be an unconfined surficial aquifer.

The unconsolidated sediment thickness at the PGF site ranges from 55 – 60 m, as the Athabasca River has created reasonably thick sediments above bedrock due to fluvial incision of the bedrock topography (Atkinson and Lyster 2012).

The PGF site is completely situated on eolian or windblown sand with silt deposits, which is why the PGF site has had ongoing gravel extraction activities. However, the eolian materials do not necessarily extend to the bedrock surface as they often are deposited as a veneer of sandy material on finer-grained moraine and or other glacially derived sediments.

Further exploration of the possibility of using groundwater from below the base of groundwater protection (i.e., above 4,000 parts per million (ppm) total dissolved solids (TDS); Alberta Energy Regulator 2023b, (https://www.aer.ca/providing-information/data-and-reports/activity-and-data/base-of-groundwater-protection-data)). Using the Base of Groundwater Protection Query Tool (https://dds.aer.ca/BGP/UI/BGP-Main.aspx), the base of groundwater protection is estimated at approximately 100 metres (m) across the area. This is an estimate of the depth in which the groundwater would have greater than 4,000 ppm TDS.

Deeper aquifer may be able to provide sufficient groundwater production. However, there is insufficient information to determine if this is a feasible water supply alternative given the groundwater geochemistry from deep regional aquifer units. The first available bedrock aquifer that may yield sufficient groundwater is the Brazeau Formation, a thick undifferentiated unit with sandstone beds. The Brazeau Formation is laterally correlated with the Belly River Formation in other portions of the province which the lower portion of (Lower Belly River) is a high yielding aquifer (Fenton et al. 2013). However, this aquifer would likely be encountered approximately 500 – 800 m below grade.

14.1.4 Surface Water and Fish and Fish Habitat

The Project falls within the Upper Athabasca sub-watershed of the Athabasca Watershed. The PGF site is located approximately 800 m north of the Athabasca River. A desktop assessment was conducted using digital imagery to identify potential watercourses crossed by the proposed pipelines and transmission line routes (Table 14.2). Field-verification of the watercourse crossings will be completed prior to construction and mitigation measures will be implemented during construction to address potential effects on surface water, and fish and fish habitat (Section 19.7.2). As required, survey results and additional or site-specific mitigation measures will be included in an Environmental Protection Plan (EPP) and environmental alignment sheets, prior to construction. The Athabasca River and its tributaries in this area are identified within the Edson Management Area *Water Act* Code of Practice (COP) Map as Class C waterbodies with a restricted activity period (RAP) from September 1 to July 15 (AENV 2006).

Table 14-2 Summary of Watercourses Crossed by the Project Components

Project Component[1]	Legal Location	Crossing ID	Watercourse Name	COP Class[2]	COP RAP[3]
Natural Gas Pipeline	SW 16-060-15 W5M	WX-001	Unnamed	C	September 1 to July 15
	SW 14-060-15 W5M	WX-002	Unnamed	C	September 1 to July 15
	NE 13-060-15 W5M	WX-003	Unnamed	C	September 1 to July 15
	NE 13-060-15 W5M	WX-004	Unnamed	C	September 1 to July 15
	SE 19-060-14 W5M	WX-005	Unnamed	C	September 1 to July 15
	SW 20-060-14 W5M	WX-006	Unnamed	C	September 1 to July 15
	SW 20-060-14 W5M	WX-007	Unnamed	C	September 1 to July 15
	NW 20-060-14 W5M	WX-008	Unnamed	C	September 1 to July 15
	NE 20-060-14 W5M	WX-009	Unnamed	C	September 1 to July 15
	NE 20-060-14 W5M	WX-010	Athabasca River	C	September 1 to July 15
	NE 20-060-14 W5M	WX-011	Unnamed	C	September 1 to July 15
	NE 20-060-14 W5M	WX-012	Unnamed	C	September 1 to July 15
	SW 28-060-14 W5M	WX-013	Unnamed	C	September 1 to July 15
	SW 26-060-14 W5M	WX-014	Unnamed	C	September 1 to July 15
	SW 25-060-14 W5M	WX-015	Chickadee Creek	C	September 1 to July 15
	SW 25-060-14 W5M	WX-016	Unnamed	C	September 1 to July 15
CO_2 Pipeline	SW 5-060-14 W5M	WX-017	Unnamed	C	September 1 to July 15
	SW 25-060-14 W5M	WX-018	Chickadee Creek	C	September 1 to July 15
	NE 34-060-14 W5M	WX-019	Chickadee Creek	C	September 1 to July 15
	SW 34-060-14 W5M	WX-020	Unnamed	C	September 1 to July 15
	SW 34-060-14 W5M	WX-021	Unnamed	C	September 1 to July 15
	SW 34-060-14 W5M	WX-022	Unnamed	C	September 1 to July 15
	NW 26-060-14 W5M	WX-023	Unnamed	C	September 1 to July 15
CO_2 Pipeline Route, Natural Gas Route	NE 14-060-13 W5M	WX-024	Unnamed	C	September 1 to July 15
Transmission Line (Option 1 and Option 2)	NW 09-060-12 W5M	WX-025	Sakqatamau Creek Side Channel	C	September 1 to July 15
	NW 09-060-12 W5M	WX-026	Sakqatamau Creek	C	September 1 to July 15
	NW 11-060-12 W5M	WX-027	Unnamed	C	April 16 - June 30
	NE 11-060-12 W5M	WX-028	Unnamed	C	April 16 - June 30
	NE 07-060-11 W5M	WX-029	Unnamed	C	April 16 - June 30
	NE 07-060-11 W5M	WX-030	Unnamed	C	April 16 - June 30
	NW 08-060-11 W5M	WX-031	Unnamed	C	April 16 - June 30

Table 14-2 Summary of Watercourses Crossed by the Project Components

Project Component[1]	Legal Location	Crossing ID	Watercourse Name	COP Class[2]	COP RAP[3]
Transmission Line (Option 2)	NE 09-060-11 W5M	WX-032	Unnamed	C	April 16 - June 30
	SE 04-060-11 W5M	WX-033	Athabasca River	C	September 1 - June 30
	SE 04-060-11 W5M	WX-034	Unnamed	C	April 16 - June 30
	NW 4-059-11 W5M	WX-035	Unnamed	C	April 16 - June 30
	NW 27-059-11 W5M	WX-036	Unnamed	C	April 16 - June 30
	SW 27-059-11 W5M	WX-037	Unnamed	C	April 16 - June 30
	NW 22-059-11 W5M	WX-038	Unnamed	C	April 16 - June 30
	SW 15-059-11 W5M	WX-039	Unnamed	C	April 16 - June 30

NOTES:
[1] Project components are combined in areas where wetlands overlaps both components in the same area (e.g., where the CO_2 and natural gas pipeline parallel one another and overlap the same wetland)
[2] ESRD. 2013a.
[3] ESRD. 2006.

Fisheries and Ocean Canada (DFO) has identified the Athabasca River and its tributaries in this area as being with range of distribution for bull trout (*Salvelinus confluentus*; Western Arctic population listed as Special Concern under Schedule 1 of *Species at Risk Act* (SARA)), and as critical habitat for rainbow trout (*Oncorhynchus mykiss;* Athabasca River population listed as Endangered under Schedule 1 of SARA) (DFO 2022a). Critical habitat for this species includes the watercourses, a 30 m-wide riparian area on either bank, and areas of groundwater recharge within 100 m of the watercourses.

Several fish species at risk and species of management concern have been observed in watercourses and the potential for habitat exists in this portion of the Athabasca River watershed (AEP 2022a; Table 14.3). No additional federally-listed aquatic species at risk (e.g., aquatic plants, molluscs) are known to exist in this area.

Table 14-3 Fish Species at Risk and Species of management Concern Noted within the Watercourses in the Project Vicinity

Species Name	Scientific Name	Alberta General Status[1]	Alberta *Wildlife Act* Status[2]	SARA Status[3]
Bull trout (Western Arctic population)	*Salvelinus confluentus*	At Risk	Threatened	Special Concern
Arctic grayling	*Thymallus arcticus*	May Be at Risk	Special Concern	-
Athabasca rainbow trout (Athabasca River population)	*Oncorhynchus mykiss*	At Risk	Threatened	Endangered

Table 14-3 Fish Species at Risk and Species of management Concern Noted within the Watercourses in the Project Vicinity

Species Name	Scientific Name	Alberta General Status[1]	Alberta *Wildlife Act* Status[2]	SARA Status[3]
largescale sucker	*Catostomus macrocheilus*	Sensitive	-	-
spoonhead sculpin	*Cottus ricei*	May Be at Risk	-	-
pygmy whitefish	*Prosopium coulterii*	At Risk	Threatened	-
Sources: [1] AEP 2020a [2] GOA 1997 [3] GOC 2023				

The Athabasca River Above Whitecourt sub-watershed is within the "yellow zone" for whirling disease/aquatic invasive species decontamination risk (GOA 2020). The "yellow zone" represents high risk waters for the introduction and/or spread of whirling disease due to the presence of susceptible species and high use of and access to water (GOA 2020).

14.1.5 Vegetation and Wetlands

Vegetation in the regional area surrounding the Project components contain a variety of upland and wetland plant communities, as well as many existing disturbed areas including roads, forestry cut blocks and industrial sites. Natural upland plant communities cover between 40% and 70% of the regional area while wetlands cover between 20% and 50%. Remaining areas are disturbed (AEP 2020b). Upland vegetation types include coniferous, deciduous and mixedwood forest, shrubland and riparian vegetation. Wetland types include bog and fen which have organic (muskeg) soils at least 40 centimetres (cm) deep and marsh, swamp, and shallow open water which have mineral soils or organic soils less than 40 cm deep.

The Project is not within the geographical range of any plant species protected under SARA or the Alberta *Wildlife Act.* Six species of management concern that are tracked by the Alberta Conservation Information Management System (ACIMS) may be found in the area near the Project components (Table 14.4); none of these species are protected by provincial or federal regulations.

Table 14-4 Plant Species of Management Concern that may Occur in the Project Area

Species Name	Scientific Name	ACIMS Status[1]	Last Observed
Bean-spored rim-lichen	*Lecania dubitans*	SU	3/7/1965
Dwarf notchwort	*Lophozia badensis*	SU	9/20/1964
Fringed chocolate chip lichen	*Solorina spongiosa*	S2S3	9/20/1964
-	*Hygroamblystegium varium var. varium*	S1S2	10/5/1963

Table 14-4 Plant Species of Management Concern that may Occur in the Project Area

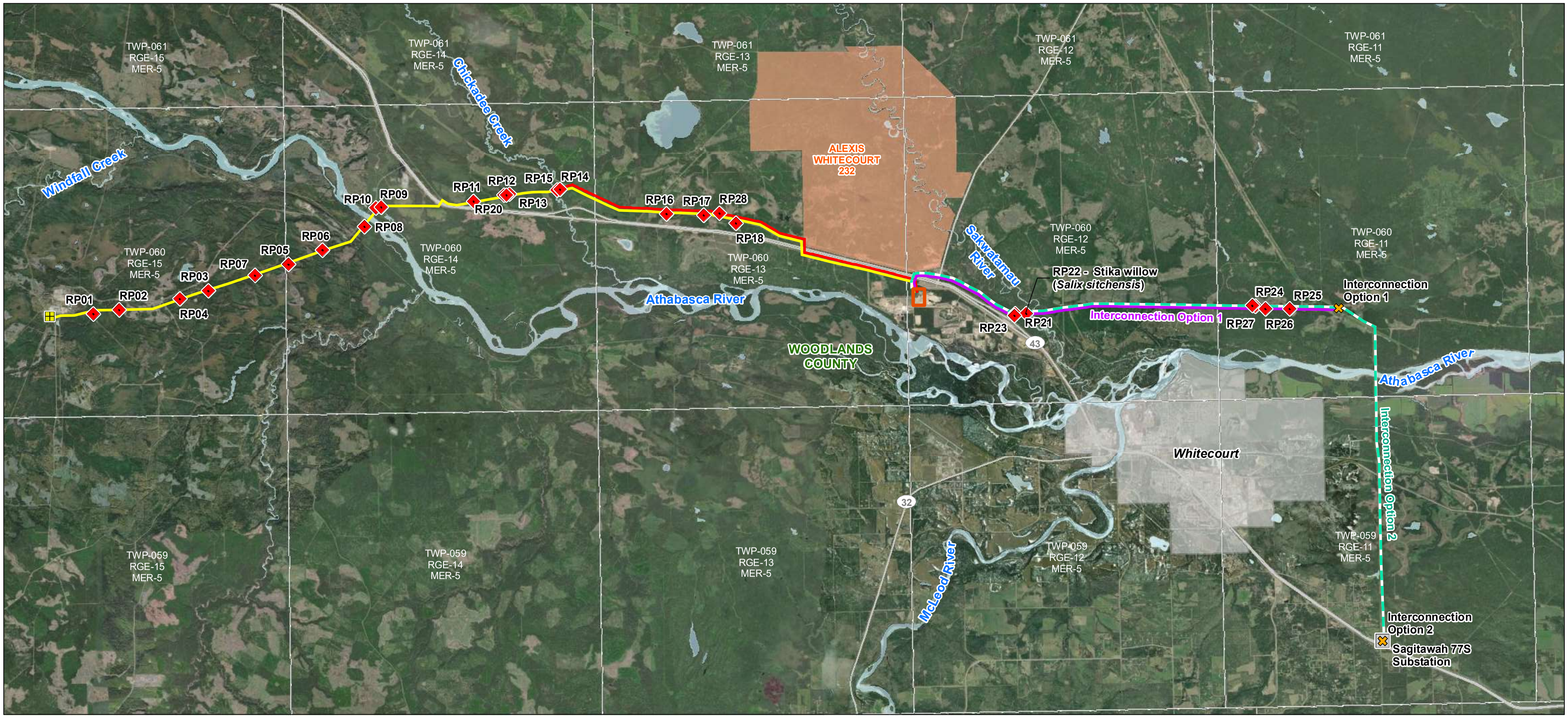
Species Name	Scientific Name	ACIMS Status[1]	Last Observed
Palmate germanderwort	*Riccardia palmata*	SU	9/12/1965
Tall blue lettuce	*Lactuca biennis*	S3	7/29/1997

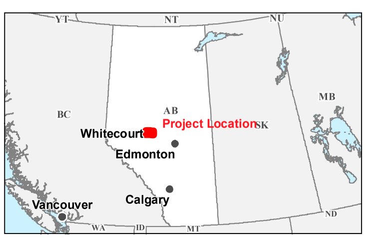
NOTES:
S#S#: A numeric range rank is used to indicate any range of uncertainty about the status of the taxon. Example - S2S3 or S1S3.
SU: Taxon is currently unrankable due to lack of information or substantially conflicting information.
S3: Known from 100 or fewer occurrences, or somewhat vulnerable due to other factors, such as restricted range, relatively small population sizes, or other factors.
S2S3: Known from twenty or fewer occurrences or vulnerable to extirpation because of other factors OR known from 100 or fewer occurrences, or somewhat vulnerable due to other factors, such as restricted range, relatively small population sizes, or other factors.
Source:
[1] ACIMS 2022

Field reconnaissance was carried out in the PGF area in the fall of 2021. The PGF appears to be mostly disturbed with natural vegetation occurring on approximately 0.73 ha (out of a total area of 15.05 ha) along northern portions of the site (Figure 14.1). Wetlands do not appear to be present at the site. Permission to access to the PGF site was not in place during the site reconnaissance. However, young aspen (*Populus tremuloides*), white spruce (*Picea glauca*), and smooth brome (*Bromus inermis*) were observed near the road on the west edge of the proposed PGF site. A timber volume (coniferous and deciduous) of 75 m^3 was estimated for the PGF site.

The natural gas pipeline, CO_2 pipeline, and power transmission line will cross a variety of upland vegetation types, including coniferous, deciduous and mixedwood forest, shrubland and riparian vegetation associated with watercourses. A review of desktop mapping indicates that the natural gas pipeline, CO_2 pipeline, and power transmission line intersect a variety of wetlands, largely fens and swamps (Table 14.5). Wetlands will be field-verified prior to construction and mitigation measures will be implemented during construction to address potential effects on wetlands (Section 19.6.3). As required, survey results and additional or site-specific mitigation measures will be included in an Environmental Protection Plan (EPP) and environmental alignment sheets, prior to construction.

As the pipelines will cross areas recently logged and will parallel existing pipeline ROWs, powerline easements and roads, areas of open, regenerating, and non-native vegetation will also be encountered. All three Project components (two pipelines and transmission line) are expected to parallel existing disturbance (e.g., existing rights of way).





Rare Plant Survey Site
Interconnection Site
Existing Substation
NGTL Windfall Meter Station
Interconnection Option 1
Interconnection Option 2
Preferred CO_2 Pipeline Route
Preferred Natural Gas Pipeline Route
Proposed Power Generation Facility
First Nation Reserve
Township
Urban Area
Waterbody

0 1 2 3 4 Kilometres
(At original document size of 11x17)
1:125,000

N

Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Government of Alberta and Canada, Stantec and General Electric
3. Background Image: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Stantec

Project Location
Whitecourt,
Alberta

Prepared by SL on 2023-08-22
TR by SM on 2023-08-22
IR Review by JR on 2023-08-22

Client/Project
110220760-025
Client: Moraine Initiatives Ltd.
Project: Moraine Power Generation Project
Detailed Project Description

Figure No.
14.1

Title
2023 Early and Late Rare Plant Surveys

Table 14-5 Summary of Wetlands Intersected by the CO_2 Pipeline, Natural Gas Pipeline and Transmission Line (Option 1 and Option 2)

Project Component[1]	Wetland[2]	Area (ha)
CO_2 Pipeline and Natural Gas Pipeline	FWc, fen, wooded, coniferous	269.34
	MGIII, marsh, graminoid, seasonal	0.62
	MGIV, march, graminoid, semi-permanent	3.79
	SSII, swamp, shrubby, temporary	2.77
	SSIII, swamp, shrubby, seasonal	0.76
	SWc, swamp, wooded, coniferous	1.37
	SWd, swamp, wooded, deciduous	12.41
	SWm, swamp, wooded, mixedwood	11.54
Interconnection Option 1 and Interconnection Option 2	FWc, fen, wooded, coniferous	196.22
	MGIII, marsh, graminoid, seasonal	0.52
	SSII, swamp, shrubby, temporary	3.17
	SSIII, swamp, shrubby, seasonal	1.64
	SWc, swamp, wooded, coniferous	141.57
	SWd, swamp, wooded, deciduous	10.81
	SWm, swamp, wooded, mixedwood	26.21
Interconnection Option 2	FWc, fen, wooded, coniferous	417.23
	MG, marsh, graminoid	2.08
	MGII, marsh, graminoid, temporary	1.12
	MGIII, marsh, graminoid, seasonal	7.58
	SSII, swamp, shrubby, temporary	8.75
	SWc, swamp, wooded, coniferous	31.73
	SWd, swamp, wooded, deciduous	107.60
	SWm, swamp, wooded, mixedwood	15.35
	WAV	4.00
Natural Gas Pipeline	FWc, fen, wooded, coniferous	873.59
	MGIII, marsh, graminoid, seasonal	3.06
	SSII, swamp, shrubby, temporary	0.71
	SSIII, swamp, shrubby, seasonal	12.16
	SWcm swamp, wooded, coniferous	770.38
	SWd, swamp, wooded, deciduous	0.26
	SWm, swamp, wooded, mixedwoord	56.51

NOTES:

[1] Project components are combined in areas where wetlands overlaps both components in the same area (e.g., where the CO_2 and natural gas pipeline parallel one another and overlap the same wetland)

[2] Wetland classification Alberta Wetland Classification System (ESRD 2015)

14.1.6 Wildlife and Wildlife Habitat including Species at Risk and Migratory Birds

The Project falls within the range of distribution of species protected under both SARA (GOC 2023) and the MBCA. There is potential for interactions with species at risk and migratory birds during Project construction and operation if suitable habitat is available. Generally, undisturbed areas are more likely to support species at risk and nesting migratory birds than previously heavily disturbed sites . Table 14.6 lists the federally-listed species at risk that could occur near the Project and also indicates if the species and their nests are protected under the MBCA.

Table 14-6 Federally-Listed Species at Risk that may Occur in the Project Vicinity

Species Name	Scientific Name	Alberta General Status[1]	SARA Status[2]	Migratory Bird[**]	Habitat Association
Birds					
Horned grebe	*Podiceps auritus*	Sensitive	Special Concern	Migratory Bird	Small, shallow, graminoid ponds and marshes
Western grebe	*Aechmophorus occidentalis*	At Risk	Special Concern	Migratory Bird	Lakes surrounded by emergent vegetation
Yellow rail	*Coturnicops noveboracensis*	Undetermined	Special Concern	Migratory Bird	Sedge meadows and marshes
Short-eared owl	*Asio flammeus*	May Be at Risk	Special Concern	-	Open areas in forest, fens, bogs and grasslands
Peregrine falcon	*Falco peregrinus anatum*	At Risk	-		Cliff edges and manmade structures
Common nighthawk	*Chordeiles minor*	Sensitive	Threatened	Migratory Bird	Burned forest, clearings, open forests, rock outcrops, gravel areas
Olive-sided flycatcher	*Contopus cooperi*	May Be at Risk	Threatened	Migratory Bird	Coniferous and mixed forests, near open areas/edges; burns, with tall trees, dead standing trees
Bank swallow	*Riparia riparia*	Sensitive	Threatened	Migratory Bird	Banks of lakes, rivers, streams, wetlands, reservoirs near open areas
Barn swallow	*Hirundo rustica*	May Be at Risk	Threatened	Migratory Bird	Near open areas including fields, highways, and open spaces in cities. Overhanging structures necessary.
Rusty blackbird	*Euphagus carolinus*	Sensitive	Special Concern	-	Shrubby or treed edges of wetlands, rivers, lakes, beaver ponds and oxbows.
Evening grosbeak	*Coccothraustes vespertinus*	Secure	Special Concern	Migratory Bird	Mature/old coniferous and mixed forest
Canada warbler	*Cardellina canadensis*	May Be at Risk	Threatened	Migratory Bird	Moist mixed forests with well-developed understory

Table 14-6 Federally-Listed Species at Risk that may Occur in the Project Vicinity

Species Name	Scientific Name	Alberta General Status[1]	SARA Status[2]	Migratory Bird**	Habitat Association
Mammals					
Little brown myotis	*Myotis lucifugus*	May Be at Risk	Endangered	-	Mature/old forests with large trees with cavities, loose bark; rock crevices; buildings
Northern myotis	*Myotis septentrionalis*	May Be at Risk	Endangered	-	Mature/old forests with large trees with cavities, loose bardk; rock crevices; buildings
Grizzly bear*	*Ursus arctos*	At Risk	Special Concern	-	Open, berry producing areas, river valleys
Amphibians					
Western toad*	*Anaxyrus boreas*	Sensitive	Special Concern	-	Shallow pools, creeks, marshes
Invertebrates					
Gypsy cuckoo bumble bee	*Bombus bohemicus*	Not Assessed	Endangered	-	Meadows, mixed farmlands, boreal forest
Yellow-banded bumble bee	*Bombus terricola*	Not Assessed	Special Concern	-	Open habitats, including meadows within forests, grasslands, riparian zones, urban parks, gardens, agricultural areas, and roadsides
Transverse lady beetle	*Coccinella transversoguttata*	Not Assessed	Special Concern	-	Habitat generalists using many types, including meadows, forests, grasslands, riparian zones, urban parks, gardens, agricultural areas, and roadsides

NOTE:
* Species occurrence recorded within 2 km of the Project components (AEP 2022b).
** Species is protected as a Migratory Bird under the MBCA
"-"= not protected as a Migratory Bird under the MBCA or not applicable.
SOURCES:
[1] GOA 2020
[2] GOC 2023

A query of the Fish and Wildlife Information Mapping Tool (FWIMT) database yielded records for wildlife species occurring within a 2 km radius of the PGF site. Grizzly bear and western toad are the only SARA-listed species records derived from FWIMT for which occurrences have been recorded in this area (AEP 2022b).

Wildlife habitat field reconnaissance was carried out with the vegetation and wetland reconnaissance of the PGF site area in the fall of 2021. Permission to access the PGF site was not in place during the site reconnaissance. The presence of wildlife features that might require restricted activity setbacks or any other wildlife-related constraints were not noted during roadside observations of the PGF site. As the site is largely disturbed by aggregate operations, it is unlikely that it contains high quality habitat for wildlife, including species at risk.

The PGF site, CO_2 pipeline route and portions of the natural gas pipeline and power transmission line routes occur within a KWBZ. A KWBZ is a provincial land use designation that is meant to protect biodiversity values and, in this case, ungulate winter ranges. Project-related constraints due to the KWBZ designation are associated with a restricted activity period from January 15 to April 30 wherein only certain activities are permissible (GOA 2021). Under certain circumstances, provincial guidelines for KWBZ allow for some flexibility with respect to timing restrictions; exceptions require government approval and could require additional mitigation measures. The Alberta Master Schedule of Standards and Conditions (MSSC; GOA 2021) specifies construction timing requirements and other mitigation measures for activities on Crown lands within KWBZs.

Portions of the pipelines and power transmission line route may occur within the edge of the Swan Hills core and secondary grizzly bear ranges, which are provincially designated. As part of the Grizzly Bear Recovery Plan (AEP 2020c), the Government of Alberta identified core and secondary access management areas within the recovery zone for the conservation of grizzly bear. Core areas contain high quality grizzly bear habitat and low road density (AEP 2020c) and are buffered by secondary zones to help connect core conservation areas. The MSSC (GOA 2021) specifies construction siting and timing requirements and other mitigation measures for activities on Crown lands within grizzly bear zones.

The natural gas pipeline may pass within 500 m of a provincially-designated trumpeter swan waterbody. The MSSC (GOA 2021) specifies construction activity and timing requirements and other mitigation measures for activities on Crown lands within a 500 m and 800 m buffer around trumpeter swan waterbodies. Development of new infrastructure within this area requires government approval and could require additional mitigation measures.

The Project is within Migratory Bird Nesting Zone B5 with a primary nesting period[1] from May 1 to August 31 (Environmental and Climate Change Canada [ECCC] 2018). The active nests of migratory birds are protected under the *Migratory Birds Convention Act*. As such, activities that could potentially interact with active nests are subject to a restricted activity period that is based on ECCC's nesting calendar and is specific to the location of the activity (ECCC 2018).

The Project does not intercept areas that are mapped for sensitive amphibians, sensitive snake habitat, sensitive raptors, caribou ranges or federally-designated critical habitat for SARA-listed wildlife species. Similarly, the Project does not intersect areas that are mapped for bird conservation (Bird Studies Canada and Nature Canada 2015).

[1] Defined as the period when >10% of total nesting species are engaged in breeding activities plus the recommended extended RAP for migratory bird species at risk (Gregoire 2020, pers. comm.).

14.1.7 Historical Resources

The Listing of Historic Resources (AC 2021) was reviewed relative to the Project. Sites are classified as having a potential for archaeological (a), palaeontological (p) or cultural (traditional land use) (c). The PGF site does not have Historical Resource Values but does require an Historical Resources Application be filed with AC to obtain *Historical Resources Act* clearance. The proposed pipelines and power transmission line may cross quarter sections with designated historical resource values (HRV) of 4 (contains a historic resource that may require avoidance or assessment) and 5 (high potential to contain a historic resource). It is possible that the areas near the Athabasca River crossing could have additional historical importance, which would be determined during AC review.

15 Health, Social and Economics of Woodlands County and the Town of Whitecourt

Woodlands County is a rural municipality, approximately 7,668 square kilometres (km^2) in area, located 150 km northwest of Edmonton, Alberta. The County surrounds (but does not include) the Town of Whitecourt and the Alexis Nakota Sioux Nation, Whitecourt #232. Urban areas within the County include the Hamlets of Blue Ridge, Goose Lake, and Fort Assiniboine. The population of the County in 2021 was 4,558 people (Statistics Canada, Census 2021), which is a 16% increase over the last two decades, but also a 4% decrease from 2016. The age composition of the County shows the largest proportion being two-person households followed by households with three or more residing in one dwelling. Median household income was $104,000 in 2021. In the 2016 census, 62% of the population in the County were employed and the unemployment rate was 14.3%. Approximately 15% of the labour force for the region were employed in mining, the largest group by industry (Statistics Canada, Census 2016).

Alexis Nakota Sioux Nation's (Band No. 437 [ANSN]) traditional territory extends from Cardinal River in the south along the foothills and Rocky Mountains beyond Whitecourt and the Swan Hills in the north and reaches east past Barrhead (ANSN 2023). ANSN is composed of four reserves covering an area of approximately 14,479 ha (Crown-Indigenous Relations and Northern Affairs Canada [CIRNAC] 2022):

- Alexis 133
- Alexis Cardinal River 234
- Alexis Elk River 233
- Alexis Whitecourt 232

As of June 2022, ANSN had a registered population of 2,198 members, of which 1,224 members live on reserve.

Alexis Whitecourt 232 is located just north of the proposed PGF site, on the other side of Hwy 43. It has a population of 0, as reported in the 2021 Census (Statistics Canada, Census 2021).

The ANSN has departments dedicated to Indigenous skills and employment training, child and family services, childcare services, education, economic development, capital projects, housing, heritage and language, recreation, lands consultation, social development, and public works (ANSN 2023). ANSN owns and operates the Eagle River Casino and Travel Plaza in Whitecourt, Alberta. ANSN also acquired a majority ownership position in Backwoods Energy Services, which provides services to oil, gas, and forestry industries in Alberta and British Columbia.

The Town of Whitecourt is located on Highway 43 at the confluence of the McLeod River and the Athabasca River and is surrounded by Woodlands County. The Town covers a 10.22 km^2 area and includes a population of 9,195 people as of the 2021 census a 3.4% decline over the past 5 years (Statistics Canada, Census 2021). The age composition of the Town shows the largest population in the 15 to 64 years age group at 68.6% followed by the under 14 years at 21.9%. Of the largest age group, men make up 69.3% and women 67.9% of the population, and children under 14 are similar as 22% are male and 21.8% are female (as listed). Of the population, 78.1% is married or living common-law and 27.8% live in private dwellings of two or more people. Median household income was $85,000 in 2020 (Statistics Canada, Census 2021), a change of -9.6% from $94,000 in 2015. Total income for men was $81,000 and for women $42,000 in 2020, with is higher than the Alberta and Canada average values for men and lower for women. Indigenous identification in the 2021 Census included 12.8% of the population for Whitecourt, identified as 725 Métis and 450 First Nations, while there were no Inuit identified for Whitecourt. The Indigenous population in Whitecourt is younger than the non-Indigenous population, and the average age of the Indigenous population was 30.2 years versus the 36.2 years average for non-Indigenous population. The largest racialized groups population (non-indigenous) are that of Filipino, making up 66.6% of the total population, followed by Black, representing 1.2% of the total population as reported by Statistics Canada (Census 2021). The community supports events for the LGBT2Q+ community such as Pride celebrations and Alberta Health Services supports wellness initiatives. The employment rate in Whitecourt is declining at a rate of 0.58% per year from 2001 to 2016. In 2016, the employment rate was 74.6% and the unemployment rate was 12.9% (Statistics Canada, Census 2016); however, in 2021, the employment rate was 72.7% and unemployment rate was 12.3% (Statistics Canada, Census 2021). The economic sectors accounting for the highest labour force for the town are in the mining, quarrying and oil and gas extraction sector at 12.3% in 2021 versus 13.1% in 2016, followed by retail at 13% in 2016 and manufacturing at 12.1% in 2021 (Statistics Canada, Census 2021).

A summary of the community health profile for the local geographic area (LGA) referred to as Whitecourt, includes most of Woodlands County, the Town of Whitecourt and the Alexis Nakota Sioux Nation, Whitecourt #232 (GOA 2019a) is presented in Table 15.1.

Table 15-1 Health-related Indicators, Whitecourt

Indicators	Whitecourt*	Alberta
Population Health Indicators (for Alberta North Zone that includes Woodlands County and Town of Whitecourt)		
Obese Adults	23.3%	22.1%
Inactive People	32.0%	22.1%
Demographics		
Population Increase 1988-2018	37.2%	49.1%
Largest Age Group (35-64 years old)	41.7%	40.2%
Children under 17	25.1%	22.4%
Individuals 65 and older	7.6%	12.5%
Social Determinants of Health Indicators		
Proportion of First Nations and Inuit People	2.5%	2.8%
Female lone-parent families	10.3%	11.0%
Proportion of families with an after-tax low-income level	13.3%	15.6%
Most common non-official languages spoken at home in the Whitecourt LGA are Tagalog (Philipino, Filipino) German, Cantonese, Vietnamese, and Urdu		
Chronic Disease Prevalence		
Hypertension was the highest per 100	21.8	20.6

Table 15-1 Health-related Indicators, Whitecourt

Indicators	Whitecourt*	Alberta
Maternal Health		
Birth rate per 1,000 women	27.2	26.0
Teen birth rate per 1,000 women	8.9	10.6
Sexually Transmitted Infections		
Chlamydia and Non-Gonococcal Urethritis rates were higher in the Whitecourt LGA than the provincial rates for the top 5 STI.		
Mortality		
Mortality rate per 100,000 population	729.8	699.5
Emergency Service Utilization		
Semi and non-urgent emergency visits accounted for 56.4% of all emergency visits in the Whitecourt LGA in 2017/2018.		
Acute upper respiratory infections, per 100,000 population in 2017 were most common	7,432.9	2,777.5
Inpatient Service Utilization		
Ischemic heart disease, pneumonia, and diabetes were the top three main reasons for inpatient separations in 2018.		
Mental and Behavioral Disorders		
Emergency department visit rate for mental and behavioral disorders per 100,000 population in 2017	723.6	786.9
Primary Health Care Indicators		
Ambulatory care sensitive conditions separation rate per 100,000 population	364.4	360.7
Rate of people with three or more chronic diseases per 100 population	5.0	4.2
Life expectancy at birth	79.7 years	81.2
Access to Health Care Services		
In 2017/2018, ambulatory care visits made up 43.6% of all ambulatory care visits out of the Whitecourt LGA and most to the University of Alberta Hospital.		

Medical services in the LGA of Whitecourt include the Whitecourt Healthcare Centre and two family physician offices located in Whitecourt. The Town of Whitecourt also offers a wide variety of health and wellness services to residents including primary care physicians, dentists, chiropractic services, optometrists, physiotherapy, supportive living facilities, as well as other health and wellness practitioners.

Woodlands County and the Town of Whitecourt offers several tourism and recreational activities including provincial parks and municipal parks (Carson-Pegasus Provincial Park, Fort Assiniboine Sandhills Wildland Natural Area, Riverside Park, Friendship Park, Eastlink Park, Rotary Park), golf courses, swimming pools, fishing in the Athabasca and McLeod River and a multitude of lakes, Forest Interpretive Centre and Heritage Park, Fort Assiniboine Museum.

15.1 Employment Considerations

Statistics and baseline information provide how men and women are currently employed in the workforce and in customary livelihood occupations. Understanding how the community's economy and livelihoods exist within the region where the Project will be built and operated can be used to understand how the Project will benefit or adversely affect the working population. Consideration of these aspects allow for MIL to then identify:

- What training opportunities are necessary and available for prospective workers
- How accessible the opportunities are for different groups of men and women; workers with families; workers without means to travel to site individually
- Consideration of barriers for different groups to take up employment (e.g., shift work and other personal family commitments)
- Consideration of how the Project employment needs may impact other business sectors

Known local resources for employment support and training programs include the Whitecourt Alberta Works Office and the Alexis Nakota Sioux Nation (Sub-office) for band members in Whitecourt. Métis people in the region have access to offices across Alberta through the Rupertsland Institute. Family and community support services, including senior services, youth services and programs, are also supported through partnerships between local governments and the Province of Alberta on an 80/20 share basis.

15.2 Labour Force and MIL Policies

The construction work force for the Project is estimated at 600-700 persons, over a 3-year period. During operations, the work force is estimated at 32 persons over a 40-year operating period.

MIL is committed to the development of a hiring and training strategy for the Project that provides opportunities for Indigenous and local contractors and individuals. Development and finalization of a construction schedule and contracting needs will be completed in conjunction with award of an EPC Contractor. Policies and commitments made by MIL will be carried forward to contractors and companies used for the construction and operation of the Project. Construction workers are anticipated to be from the area, working from Whitecourt, the Alexis Nakota Sioux Nation, or surrounding communities; construction camps will not be required.

Construction support will be considered in the detailed engineering and contracting process to outline policies, needs and accessibility to trained labour. To the extent possible, hiring of local labour and Indigenous labour will be prioritized based on, workforce availability, further engagement and discussions with Indigenous nations, the final EPC Contractor, and the other contractors.

In addition to MIL company policies for employment, hiring, health and safety, contractors (companies and individuals) will be expected to follow the Alberta Construction Association Code of Ethics and the Alberta Obligations of Work Site Parties.

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

16 Financial Support from Federal Authorities

Financial support for the Project is not required from federal authorities. The Canadian government has proposed a number of incentives to encourage private sector companies to invest in clean electricity projects and carbon capture as they move toward a decarbonized electricity grid by 2035. These include investment tax credits related to carbon capture value chain investment and clean electricity investment, potential development stage funding support, and potential contract structures intended to reduce risk related to future greenhouse gas reduction regulation. MIL expects to explore some or all of these types of federal supports to the extent available and appropriate in pursuit of its overall business objectives.

17 Use of Federal Lands for Project

The Project will not be constructed or operated on federal lands. Potential effects of the Project on reserve lands, as it relates to effects on current use of lands and resources for traditional purposes, impacts on the exercise of Aboriginal and/or Treaty Rights, and associated mitigation measures are provided below in Section 21 and 22.

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

18.1 Federal Regulatory Requirements

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

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

Other federal acts that could be relevant to the Project components and planned during construction methods, include the following acts:

- *Canadian Navigable Water Act* (all crossings of navigable watercourses will be completed based on, and the Minor Works Order)
- *Aeronautics Act*

However, all crossings of navigable watercourses will be completed based on the Minor Works Order, and therefore no authorization is required under the *Canadian Navigable Water Act*. Similarly, the Whitecourt Airport is a non-certified aerodrome, based on current designation, and the *Aeronautics Act* does not apply to the airport, and thus the Project.

18.1.1 Fisheries Act

If the Project has the potential to interact with fish and fish habitat, through interactions pipeline and transmission line watercourse crossings, including for the Athabasca River and its tributaries, through other potential interactions with groundwater or tributaries to fish-bearing streams, Project-related interactions with fish and fish habitat could require authorizations under the *Fisheries Act*. A non-compliance with the *Fisheries Act* could occur if the Project results in any of the following:

- the death of any life stage of fish
- the harmful alteration, disruption or destruction (HADD) of fish habitat
- the introduction of a deleterious substance (for example hydrocarbons from heavy equipment or sediment during construction) into a watercourse or Athabasca River to which it is connected
- the alteration of flow that would impede fish migration in a watercourse

18.1.2 Migratory Birds Convention Act

Section 5.1 of the Migratory Birds Regulations, 2022 states that without a permit, the disturbance, destruction, or removal of a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or possession of a migratory bird, carcass, skin, nest, or egg of a migratory bird are prohibited. From April through August, migratory birds are nesting and fledging; any construction activities during this period require a nest sweep and species-specific buffer zones around observed active nests.

The Migratory Birds Convention Act (MBCA), defines migratory birds as a bird referred to in the Convention. The Migratory Birds Regulations are applicable to migratory game birds, migratory insectivorous birds, and migratory non-game birds referred to in the Convention.

18.1.3 Species at Risk Act (SARA)

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

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

18.2 Provincial Regulatory Requirements

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

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

18.2.1 Hydro and Electric Energy Act

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

18.2.2 Electric Utilities Act

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

18.2.3 Environmental Protection and Enhancement Act

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

The Project will require an approval under Schedule 1 Division 2, Part 9 of EPEA for the construction, operation, or reclamation of a power plant.

Additionally, a Conservation and Reclamation (C&R) Approval is required under EPEA for pipelines with an index (e.g., the diameter of pipe in millimetres (mm) multiplied by length in km) of 2,690 or greater (Class I Pipelines) outside of the Facilities site. The C&R Approval is required prior to any surface disturbance.

18.2.4 Water Act

The *Water Act* supports and promotes the conservation and management of water through the use and allocation of water in Alberta. Diversion licence applications pursuant to the Water (Ministerial) Regulation requires a licence for the diversion of water, surface and/or groundwater. The Project will require a licence if water is diverted from groundwater for the PGF.

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 (WAIR). Effects on wetlands associated with short-term/temporary disturbances caused by the construction of a pipeline or temporary access roads shall follow the standard operating practices as outlined in the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body, and the Code of Practice for Watercourse Crossings. A notification form supported by a Wetland Assessment and Impact Form (WAIF) (where applicable) shall be submitted to AEP 14 days prior to starting work.

18.2.5 Historical Resources Act

Heritage resources are regulated under the Alberta HRA and administered by the Historical Resources Management Branch of Alberta Ministry of Culture (AC). The need for, and scope of, heritage resource assessments is determined by AC based on their guidelines and requirements. AC independently assesses the scientific value of heritage resource sites and determines the need for any mitigation or avoidance measures. Project approval is required from AC prior to construction and is received as clearance under the HRA.

18.2.6 Public Lands Act

The *Public Lands Act* does not apply to construction on private property but does apply to all works on Crown land including the defined bed and shore of Crown-owned wetlands and other bodies on site.

As the Project area overlaps Crown land including pipelines, access or utilities will require dispositions.

18.2.7 Pipeline Act

The *Pipeline Act* establishes a regulatory regime for the construction and operation of pipelines in Alberta. are required for the installation of pipelines in Alberta. C&R approvals would likely be required for the CO_2 pipeline and natural gas pipeline which would be administered by the AER through EPEA. An approval under AER Directive 056 – Energy Development Applications and Schedules, would also be required for the pipelines.

18.3 Municipal Regulatory requirements

Regulatory requirements from the Woodlands County and Town of Whitecourt that may affect the Project are described in Table 18.1.

Table 18-1 Municipal Regulatory Requirements

Bylaw or Policy	Description
Woodlands County Municipal Development Plan Bylaw #406/13	The Plan is intended to provide a long-term land use planning framework for the future growth of the municipality.
Woodlands County Land Use Bylaw 490/17	The purpose of this Bylaw is to regulate and control the use and development of land and buildings within Woodlands County in order to achieve orderly and economic development of land.
Intermunicipal Development Plan for Woodlands County and the Town of Whitecourt Bylaw 401/12	The Plan outlines policies applying to county land adjacent to the Town.

18.4 Regional Plans and Management Frameworks

Woodlands County (2022) has a 2022-2025 Strategic Plan that includes strategic economic development as a goal but does not offer any details. The County also includes development plans incorporated into bylaws, as listed in Table 18.1.

The Project is in the Upper Athabasca Region; work on a land use plan (under the *Alberta Land Stewardship Act*) or management framework (under Alberta Environment and Protected Areas [AEPA]) for the region has not yet started.

Part E: Potential Effects of the Project

19 Potential Effects

19.1 Overview of Environmental Effects

The Project consists of the development of the PGF (of which the principal sub-components are the CCGT and the ICCF), along with the power transmission line, natural gas pipeline, and CO_2 pipeline and supporting infrastructure components.

19.2 Air Quality

19.2.1 Effect Pathways

Construction

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

Table 19-1 Potential Construction Phase Effects on Air Quality

Potential Effects and Pathways		Project Component		
Potential Effect	Effect Pathways	PGF	Power Transmission Line	Natural Gas & CO_2 Pipelines
Change in air quality	• Air contaminant emissions from equipment and vehicles burning hydrocarbon fuel during construction activities	✓	✓	✓
	• Dust generated during soil stripping and grading and through vehicle and equipment movement on the construction footprint and unpaved roads	✓	✓	✓

Exhaust emissions from construction equipment include, but are not limited to, excavators, rock movers, graders, packers, dozers, haul dump trucks, zoom-boom, and concrete trucks. This equipment primarily consumes diesel fuel, and the products of combustion are emitted to the atmosphere. Diesel-powered equipment also includes generators, light plants and in-line heaters. The combustion emissions are primarily nitrogen (N_2), CO_2, and water vapour (H_2O) with trace amounts of contaminants such as oxides of nitrogen (NO_X), SO_2, CO, particulate matter (PM) including diesel combustion particulate matter, volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs). These gases and particles are common by-products of fossil fuel combustion.

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

Detailed construction planning for the Project is not yet underway; however, a high-level estimate of construction and decommissioning phase emissions is provided in Table 19.2 based upon preliminary estimates of the number, type or size of construction vehicles and other equipment as well as the quantities of material that will be moved.

Table 19-2 PGF Construction Phase Air Contaminant Emissions

Pollutant	Potential Annual Emissions (tonne/year)
NO_X	3.6
SO_2	0.05
CO	1.9
TSP	231
PM_{10}	62
$PM_{2.5}$	6.8
Diesel Particulate	0.14
VOC	0.35
PAH	0.0037
NOTES: Construction period is approximately 3 years. Annual emissions are an average over the 3-year period. Decommissioning emissions estimated are approximately 1/3 of construction emissions.	

Operation

Emission of air contaminants during operation of the Project will result from the combustion of natural gas in the proposed CCGT and trace amounts of volatile organic compounds associated with the solvent-based absorption process in the ICCF. The combustion pollutant emissions are primarily NO_X, SO_2, CO, and PM. Operational emissions are reduced by using clean burning natural gas and advanced pollution control such as selective catalytic reduction (SCR). The ICCF may be a source of trace levels of VOC emissions associated with the solvent as well as pollutants associated with amine solvent degradation such as ammonia, nitrosamines, nitramines, amides, aldehydes, and volatile acids. The ICCF is designed to limit VOC emissions consistent with best available technology. During Project operation, emissions of metals or polyaromatic hydrocarbons (PAHs) are expected to be negligible. There will also be emissions of air contaminants generated from minor PGF emission sources such as emergency diesel generators, emergency diesel fire pumps, and fuel gas heaters. Table 19.3 summarizes the potential effects and pathways that may occur, and which are typical of facility operations.

Table 19-3 Potential Operation Phase Effects on Air Quality

Potential Effects and Pathways		Project Component		
Potential Effect	**Effect Pathways**	**PGF**	**Power Transmission Line**	**Natural Gas & CO_2 Pipelines**
Change in air quality	Air contaminant emissions from hydrocarbon-fueled equipment (e.g., combustion turbine) during operation	✓	-	-

The maximum estimated emissions from the PFG were calculated based upon the type and size of the gas turbine for the PFG. As a conservative assumption, no removal of air contaminants (NO_X, SO_2, ammonia (NH_3), $PM_{2.5}$, CO) is assumed as the gas turbine exhaust pass through the ICCF. The maximum potential air emissions associated with the Project, based on 347 days of operation, are summarized in Table 19.4. Based upon preliminary information gathered from potential equipment vendors, a preliminary estimate of trace level VOC emissions for the PGF is provided for acetaldehyde, formaldehyde, amines, and nitrosamines. Emissions of PAHs and metals are expected to be negligible.

Table 19-4 PGF Operations Phase Air Contaminant Emissions

Pollutant	Potential Annual Emissions (tonne/year)
NO_X	258
SO_2	12
CO	293
NH_3	95
$PM_{2.5}$	58
VOC	37
Acetaldehyde	3.1
Formaldehyde	1.1
Amines	17
Nitrosamines	0.033
NOTES: Based upon 347 days of operation at design power output.	

Abandonment

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

19.2.2 Mitigation

Construction

Mitigation measures that may be implemented during construction to address potential effects on air quality are listed in Table 19.5 and are typical to facility, pipeline, and transmission line construction projects.

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

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

Table 19-5 Potential Construction Phase Mitigation Measures for Air Quality

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in air quality	Air contaminant emissions from equipment and vehicles burning hydrocarbon fuel during construction activities	• Vehicles and equipment will be required to meet emission control standards including the On-Road Vehicle and Engine Emission Regulations and the Off-road Compression-Ignition (Mobile and Stationary) and Large Spark-Ignition Engine Emission Regulations. • The concentration of sulphur in diesel fuel shall not exceed 15 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.
	Dust generated during soil stripping and grading and through vehicle and equipment movement on the construction footprint and unpaved roads	• All work shall be conducted in a manner that minimizes the raising of dust from construction or maintenance operations. • Dust control measures such as watering roads to suppress dust distribution and ceasing operations during periods of high winds will mitigate the distribution of particulate matter during construction activities. • Disturbed surfaces will be revegetated promptly following construction to prevent wind erosion and to control dust. • Surfaces of temporary soil and overburden stockpiles will be stabilized during extended periods between usage, by means of vegetating or covering the exposed surfaces. • Silt fences and other erosion control methods such as mulching and application of tackifiers will be used to prevent soil loss from soil stockpiles due to wind erosion.

Operation

Mitigation measures that may be implemented during operation to address potential effects on air quality are listed in Table 19.6 and are typical to CCGT facility operations projects. As engineering progresses, further mitigation measures, including facility-specific mitigation measures, may be developed.

Potential effects on air quality associated with the Project were evaluated using plume dispersion modelling. The AERMOD dispersion model was run to predict maximum contaminant concentrations associated with the Project in comparison to air quality standards. Maximum predicted concentrations of all contaminants are less than the AAAQO. The maximum predicted NO_2, $PM_{2.5}$, and SO_2 concentrations at sensitive receptors associated with the Project alone are less than the Canada Ambient Air Quality Standards (CAAQS). The maximum predicted $PM_{2.5}$ and SO_2 concentrations at sensitive receptors associated with the Base Case (emissions from the ANC facility), and Application Case (emissions from the ANC facility cumulatively with the Project) are less than the relevant CAAQS; however, the maximum predicted 1-hour NO_2 concentrations at sensitive receptors associated with the Base Case and Application Case are greater than the relevant CAAQS. The predicted exceedance of the 1-hour CAAQS for NO_2 is attributable to emissions from the ANC facility. Maximum contaminant concentrations are predicted to occur near the Project and decrease with increasing distance from the Project. The dispersion modelling indicates that the operation of the Project is not expected to cause or contribute to a substantial degradation of ambient air quality. Additional information related to air quality modelling results are provided in Appendix D.

Table 19-6 Potential Operations Phase Mitigation Measures for Air Quality

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in air quality	Air contaminant emissions from hydrocarbon-fueled equipment (e.g., combustion turbine) during operation	• The Project is being designed consistent with best available control technology to minimize emissions and potential impacts on air quality. • Emissions of $PM_{2.5}$ and SO_2 are very low due to use of clean burning natural gas which contains only negligible amounts of sulphur. • The combined cycle power facility will include advanced pollution control technologies to minimize emissions such as SCR or a similar control technology to limit NO_X emissions to acceptable regulated limits. SCR systems result in a small amount of NH_3 emitted (ammonia slip). • Project NO_X emissions will be less than the Guidelines for the Reduction of Nitrogen Oxide Emissions from Natural Gas–fuelled Stationary Combustion Turbines (ECCC 2017) and Alberta Air Emission Standards for Electricity Generation (AENV 2005).

Abandonment

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

19.3 Acoustic Environment

19.3.1 Effect Pathways

Construction

Noise emissions during the construction phase will arise from construction equipment and vehicles. Table 19.7 summarizes the potential effects and pathways that may occur, and which are typical of power plant, pipeline, and transmission line construction projects.

Table 19-7 Potential Construction Phase Effects on the Acoustic Environment

Potential Effects and Pathways		Project Component		
Potential Effect	Effect Pathways	PGF	Power Transmission Line	Natural Gas & CO_2 Pipelines
Change in existing sound levels	Noise emissions from equipment and vehicles used to construct the facility (stationary, limited to facility site)	✓	-	-
	Noise emissions from equipment and vehicles used to construct linear Project components and from vehicles travelling to/from construction sites (transient)	-	✓	✓

PGF site construction activities include site clearing, earth moving and concrete work. Mobile noise emitting equipment includes up to 20 pieces of construction related equipment, including excavators, rock movers, graders, packers, dozers, haul dump trucks, zoom-boom, and concrete trucks. Stationery noise emitting equipment includes generators and light plants. The earth moving and concrete work activities are short-term and seasonal. Noise from the construction phase of the PGF site is expected to be similar to that of other construction activities and traffic in the Whitecourt vicinity.

Construction related traffic will increase marginally during workers' arrival and departure on site during the daytime period. The noise effect associated with worker mobilization is expected to be low.

During construction of the pipelines and power transmission line, Project-related noise will be generated from vehicles and equipment used to construct the infrastructure, including dozers, haul dump trucks, graders, excavators, sidebooms, and cranes. There will also be noise associated with worker arrival and departure in vehicles. As work progresses along the linear pipeline and transmission line right-of-way (ROWs), so too will the noise sources. Where the pipeline(s) is installed using a horizontal drill method, there will be noise associated with the drill, which will be stationary for a few weeks to months, based on the crossings.

Neither the AUC Rule 12 nor AER Directive 38 (AER 2023a) are applicable to construction noise.

Operation

Noise emissions during the operation phase will arise from operating the various equipment that comprises the PGF. Table 19.8 summarizes the potential effects and pathways that may occur, and which are typical of power plant operations. No noise emissions are anticipated for operations of the buried pipelines and overhead transmission line.

Table 19-8 Potential Operations Phase Effects on the Acoustic Environment

Potential Effects and Pathways		Project Component		
Potential Effect	**Effect Pathways**	**PGF**	**Power Transmission Line**	**Natural Gas & CO_2 Pipeline**
Change in existing sound levels	Noise emissions from operation of the power generation and carbon capture facility (stationary, limited to facility site)	✓	-	-

A noise impact assessment (NIA) will be completed for the Project, as compliant with AUC Rule 12. The NIA will quantity the Project's noise contribution within the acoustic study area and will be compared to the requirements under AUC Rule 12: Noise Control (AUC 2021) which sets Permissible Sound Levels (PSLs) for a Project.

Abandonment

Noise during the abandonment phase will be similar to that during the construction phase.

19.3.2 Baseline Noise Assessment

A baseline noise assessment was completed for the Project in July 2023. Results of the assessment are described below.

Noise Criteria and Noise Receptor

Noise emitted from the Project operations is regulated by AUC Rule 012: Noise Control and will comply with the PSL at the noise receptors. AUC Rule 012 is a receptor-based noise regulation and defines the noise receptor as any permanent or seasonal dwelling(s) that is within 1.5 km radius from the facility boundary. In absence of noise receptors, Rule 012 requires noise to meet the PSL at 1.5 km from the facility boundary.

Within the Project study area, the Alberta Newsprint Company (ANC) Power Plant (regulated facility) and ANC Mill (non-regulated facility) are operating facilities that affect the acoustic environment. RWDI Air Inc. (RWDI) conducted a Noise Impact Assessment (NIA) for the plant and submitted a NIA report on October 29, 2012 (RWDI 2012). RWDI 2012 NIA did not include any residential dwellings as noise receptors within 1.5 km from the ANC boundary. In 2013, ANC submitted an application for the ANC Power Plant as documented in the AUC Proceeding 2241. The ANC Power Plant project was approved in June 2013 in AUC Decision 2013-212 (AUC 2013a), the Decision indicated the following:

> *"The permissible sound levels of 50 dBA L_{eq} daytime and 40 dBA L_{eq} nighttime were established. ANFC predicted the total sound level at the 1.5 kilometre boundary of the proposed power plant to be 37 dBA. The ambient noise level of 35 dBA had been included in the total sound level".*

As the nighttime PSL is more stringent, the nighttime sound level is discussed hereafter.

The nearby Eagle River Casino & Travel Plaza is a commercial operation with no permanent or seasonal residence, and it is not considered a noise receptor by the AUC. The Eagle River Tourism RV Park (RV Park) is located approximately 1.1 km northeast of the proposed Project boundary. In the ANC Power Plant application information request (AUC 2013b), the RV Park was not treated as seasonal residential dwelling as the site was not fully constructed with features of performance (e.g., electrical power, water supply, etc.) under AUC Rule 012 definition. However, after a decade of development, the RV Park has become a fully serviced seasonal residential dwelling featuring graveled pad, 30/50-amp power supply, water and sanitation hook-ups (Eagle River Tourism RV Park n.d.). As such the RV Park should be considered as a noise receptor in the Project study area. Figure 19.1 shows the Project area and the RV Park.

The RV Park is located approximately 700 m from Highway 43 and the west end of the site is approximately 680 m from Highway 32. Population density at the RV Park may fluctuate with the operating season; therefore, the assessment assumes 1 to 8 residential dwellings within a quarter section as a conservative approach. The Basic Sound Level (BSL) at the RV Park is set as 40 decibels (dBA) (i.e., 1 to 8 population density and Category 1 classification for proximity to transportation), based on Table 1 in AUC Rule 012 (AUC 2021).

Based on the noise modelling results indicated in AUC 2013b, noise contributions from the non-regulated ANC Mill and regulated ANC Power Plant at the RV Park location are 47.6 dBA and 31.8 dBA, respectively. The combined noise contribution for the ANC Mill and the assumed ASL of 35 dBA is 47.8 dBA (logarithmic sum of 47.6 dBA and ASL of 35 dBA) at the RV Park. The 47.8 dBA represents the ASL or background sound level without any regulated facility, and it is 12.8 dB higher than the 35 dBA as prescribed in AUC Rule 012. AUC Rule 012 prescribes that an A2 adjustment for the PSL can be applied if the assumed ASL (i.e., 35 dBA) without the existing energy-related facilities is considered not representative of the actual sound levels, the area may be eligible for an ambient adjustment. In an A2 adjustment, a maximum adjustment of up to 10 dB could be applicable, based on the 47.8 dBA and 35 dBA difference. The nighttime PSL with an A2 adjustment would be 50 dBA (i.e., 40 dBA with 10 dB A2 adjustment).

Two scenarios are included in the assessment and are described below for the PSLs (with and without A2 adjustment at the RV Park):

1. Scenario 1: least favourable scenario, without A2 adjustment, the nighttime PSL is 40 dBA based on the BSL, only includes energy-related facility ANC Power Plant and excludes non-energy facility ANC Mill.
2. Scenario 2: A2 adjustment is applicable with approval by AUC, the nighttime PSL is 50 dBA as described above.

A background sound level survey and detailed acoustic modelling based on the procedures of AUC Rule 012 at the RV Park are recommended to verify the latest existing baseline sound levels and support the A2 adjustment approach (i.e., Scenario 2).

Conceptual Noise Assessment Modeling

The Project design has not been finalized, e.g., the power train layout, building sizes and other equipment inventory, as such a conceptual noise assessment modelling is established to evaluate the potential noise impact from the Project to the surrounding acoustic environment. The model results flag any potential major noise contributors, including recommended noise mitigation measures, should they be required.

A detailed NIA will be completed for the Project in the next design phase when complete design data is available to quantity the Project's noise contribution in the acoustic study area. The prediction results will be compared to the PSLs under AUC Rule 012.

Sound propagation modelling was performed using Cadna/A modelling software (DataKustik 2021), which implements the ISO standards and prediction algorithms and is widely used in industrial noise assessments. The modelling calculations were conducted using ISO 9613, *Part 1: Calculation of the absorption of sound by the atmosphere, 1993* and *Part 2: General method of calculation (ISO 9613-2:1996)*.

Acoustic modelling incorporated the physical features of the Project and the surrounding area such as buildings and tanks, and the identified noise sources. The building, stack, and storage tanks were modelled as structural elements. Sources that emit noise from a stationary position were represented as a point source (e.g., pumps, fans). Emission sources that emit noise through building facades were represented as vertical or horizontal area sources.

Within the study area, the existing ANC facilities, including the Mill and Power Plant, and the proposed Project were included in the acoustic modelling to evaluate the overall noise impact from the Project at the RV Park.

Operational Noise Source Sound Levels

Sound power levels of major noise sources were input into the acoustic modelling. At this stage, noise source emission data was collected through a combination of a Stantec database for similar equipment and industry-accepted engineering calculations. For example, noise data for the power train for the Project was based on a typical GE 7HA package datasheets from previous projects, sound levels of the Integrated CO_2 Capture Facility were derived from the database for similar equipment. Table 19.9 summarizes the sound power levels of the Project major noise sources.

Table 19-9 Project Operational Noise Source Sound Power Levels (dBA re. 10^{-12} Watt)

Equipment	Overall (dBA)	Qty.	In/Out
GE Power Train Package			
Gas Turbine (GT) Inlet Ducting (indoor section)	101	1	In
GT Inlet Ducting (outdoor section)	103	1	In
GT Inlet Filter House Face (w/ 8-foot [ft] silencing)	105	1	Out
Lube Oil Module	103	1	In
GT Inlet Plenum	102	1	In
GT Turbine Component	109	1	In
GT Exhaust Diffuser	107	1	In

Table 19-9 Project Operational Noise Source Sound Power Levels (dBA re. 10^{-12} Watt)

Equipment	Overall (dBA)	Qty.	In/Out
GE Power Train Package (con't)			
GT Load Compartment	98	1	In
GT Generator	106	1	In
GT Turbine Compartment Vent Fans	104	2	Out
Steam Turbine (ST)	114	1	In
ST Generator	106	1	In
ST Condenser	112	1	In
ST Lube Oil Skid	104	1	In
Condensate Pump	104	2	In
ST Accessories (piping, valve)	114	1	In
Heat Recovery Steam Generator (HRSG) Inlet Duct	107	1	Out
HRSG Body	110	1	Out
HRSG Accessories (piping, valve)	99	1	Out
HRSG Stack Exit (w/ 90 degree directivity)	104	1	Out
GSU Transformer	103	1	Out
Auxiliary Transformer	90	1	Out
Water Treatment System	106	1	In
Fuel Gas Compressor	116	3	In
Air Compressor	95	2	In
Air Cooled Condenser (ACC) (total 40 cells[3])	113	1	Out
Boiler Feedwater Pump	104	2	Out
Closed Cooling Water Pump	97	2	Out
Fire Pump	91	2	Out
Other Pump, Typical	91	2	Out
Building HVAC Fan	97	28	Out
Integrated CO_2 Capture Facility			
Heat Exchanger	115	4	Out
Quencher (direct contact cooler)	98	1	Out
CO_2 Absorber	94	1	Out
CO_2 Compressor	95	2	Out
GT Exhaust Blower (Induced Draft Booster Fan)	109	1	Out
Pump, Typical	91	2	Out

NOTES:
[1] Quantities of each equipment are based on GE description; actual quantity is TBD.
[2] Inside or outside building.
[3] ACC is assumed with 40 cells; actual quantity of fan cells is TBD.

Modelling Results

Based on noise source sound data listed in Table 19.9 above, noise emissions from the Project were predicted at the receptor RV Park. The results were combined with the noise effect from the Project, ANC Power Plant, as well as the ASL. All Project and third-party facilities were assumed to be operating at full load.

Scenario 1 – Nighttime PSL of 40 dBA

Table 19.10 summaries the predicted sound level from the Project, and the cumulative sound level at the receptor, and comparison with the nighttime PSL.

Table 19-10 Predicted Project, and Cumulative Sound Level at Noise Receptor – Scenario 1

Receptor	Contribution of ANC Power Plant[1] (*L_{eq}, dBA)	Project Sound Level (L_{eq}, dBA)	ASL (L_{eq}, dBA)	Cumulative Sound Level (L_{eq}, dBA)	Nighttime PSL (L_{eq}, dBA)	Sound Level Change (dB)
RV Park	31.8	40.3	35	41.8	40	+1.8

NOTES:
[1] Based on modelling results in AUC 2013b
*Equivalent Continuous Sound Pressure Level

Modelling results show that noise emissions from the current Project configuration will increase the nighttime cumulative sound level by 1.8 dB at the RV Park, exceeding the nighttime PSL of 40 dBA.

Dominant noise contributors from the Project are ranked and listed in Table 19.11, only the top 10 noise sources are listed in the table. Noise mitigation measures will be implemented on these noise sources to reduce the noise emissions from the Project (Section 19.3.3).

Table 19-11 Top 10 Noise Source Ranking of Project

Rank	Noise Source
1	ACC
2	CO_2 Exhaust Gas Blower
3	Heat Exchanger
4	HRSG Stack Exit
5	Boiler Feedwater Pumps
6	GT Building
7	GSU Transformer
8	HRSG Body
9	GT Building Ventilation
10	Closed Cooling Water Pumps

Regarding low frequency noise requirements of AUC Rule 012, the predicted dBC-dBA values at the RV Park are shown in Table 19.12.

Table 19-12 Predicted Project dBC-dBA Value at Noise Receptor

Receptor	Predicted Project Sound Level (L_{eq}, dBA)	Predicted Project Sound Level (L_{eq}, dBC)	dBC-dBA (dB)
RV Park	40.3	57.9	17.6

Results in Table 19.12 shows that if the dBC-dBA value is less than 20 dB, according to AUC Rule 012, the Project is unlikely to cause a low frequency noise issue. A detailed low frequency and tonal noise assessment may be analyzed when 1/3 octave band source sound data is available or through onsite measurements.

Scenario 2 – Nighttime PSL of 50 dBA

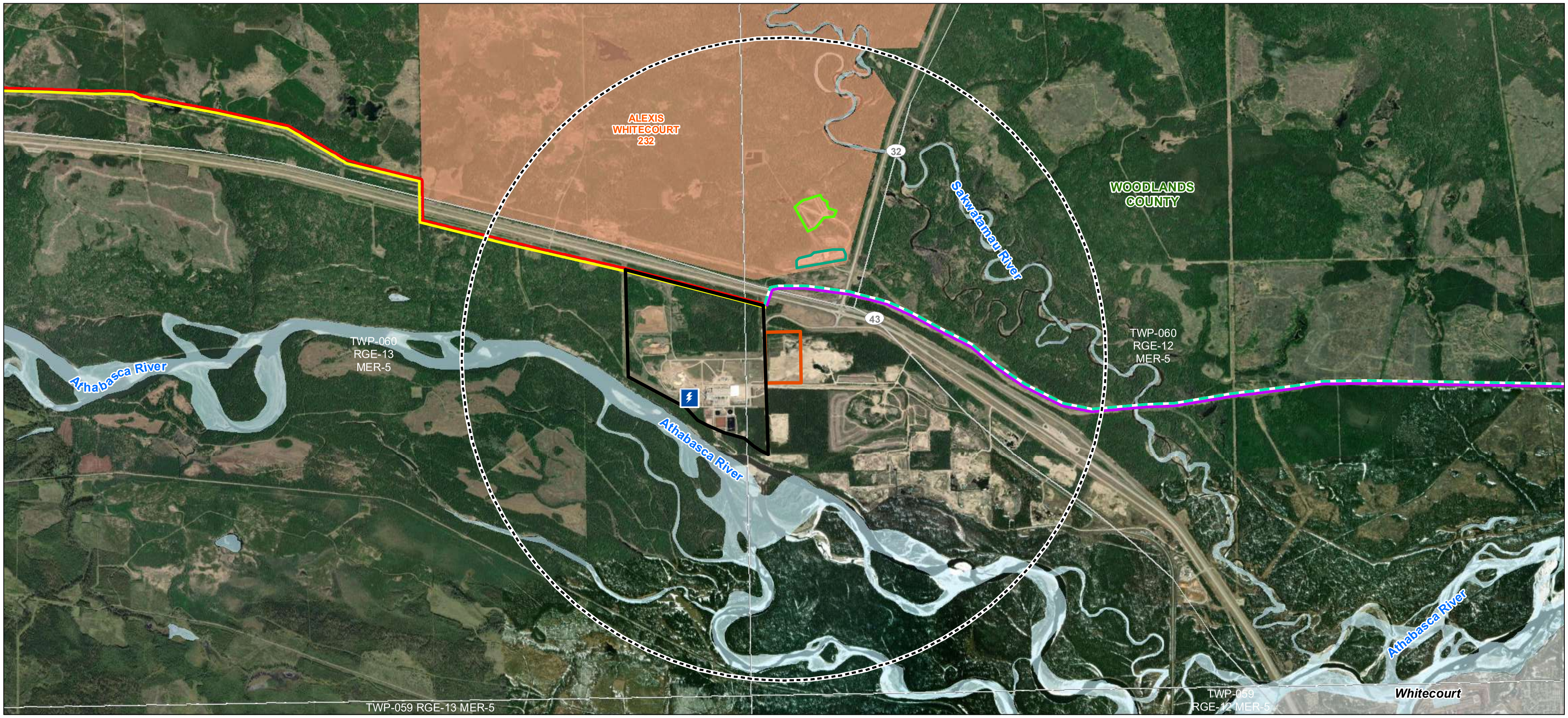
In Scenario 2, Table 19.13 summaries the predicted sound level from the Project, and the cumulative sound level at the receptor, and in comparison, with the nighttime PSL.

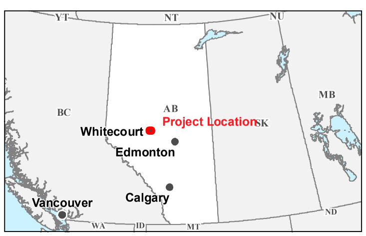
Table 19-13 Predicted Project, and Cumulative Sound Level at Noise Receptor – Scenario 2

Receptor	Contribution of ANC Power Plant[1] (L_{eq}, dBA)	Project Sound Level (L_{eq}, dBA)	ASL[2] (L_{eq}, dBA)	Cumulative Sound Level (L_{eq}, dBA)	Nighttime PSL (L_{eq}, dBA)	Comply Status
RV Park	31.8	40.3	47.8	48.6	50	Yes
NOTES: [1] Based on modelling results in AUC 2013b [2] Assuming after A2 adjustment, the ASL is 47.8 dBA						

Modelling results show that noise emissions from the proposed Project configuration will meet the nighttime PSL of 50 dBA with A2 adjustment at the RV Park. And for low frequency evaluation, same as Table 19.13 (Predicted Project dBC-dBA Value at Noise Receptor), the dBC-dBA value is less than 20 dB, and the Project is unlikely to cause a low frequency noise issue.

Mitigation measures are listed in Section 19.3.3 below and will be implemented to reduce noise effects on the acoustic environment during construction. The mitigation measures listed in Section 19.3.3 are typical to power plant, pipeline, and transmission line construction projects.





Alberta Newsprint Company (ANC) Power Plant
Alberta Newsprint Company (ANC) Property Boundary
Eagle River Casino
Eagle River Tourism RV Park
Noise Baseline Assessment Study Area (1.5km Radius)
Interconnection Option 1
Interconnection Option 2
Preferred CO_2 Pipeline Route
Preferred Natural Gas Pipeline Route

Proposed Power Generation Facility
Major Road
First Nation Reserve
Township
Urban Area
Waterbody

0 250 500 750 1,000 Metres
(At original document size of 11x17)
1:40,000

N

Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Government of Alberta and Canada, Stantec and General Electric
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Stantec

Project Location
Whitecourt,
Alberta

Prepared by SL on 2023-07-31
TR by JR on 2023-07-31
IR Review by JR on 2023-07-31

Client/Project
110220760-018 REVA
Client: Moraine Initiatives Ltd.
Project: Moraine Power Generation Project
Detailed Project Description

Figure No.
19.1

Title
Noise Baseline Assessment Area and Receptor Locations

W:\Clients\General_Electric\Sagitawah_Cogen\Figures\DetailedProjectDescription\110220760_018_NoiseStudyArea.mxd Revised: 2023-08-28 By: slemay

19.3.3 Mitigation

Construction

Mitigation measures that may be implemented during construction to address potential effects on the acoustic environment are listed in Table 19.14 and are typical to power plant, pipeline, and transmission line construction projects.

Acoustic emissions from construction equipment will be limited, transient, short-term and addressed through the use of industry codes and standards, proven effective mitigation measures, and best management practices. A Construction Noise Management Plan can be prepared to address the noise impact of the construction activities, provide guidance to restrict operations of construction activities; implement mitigation measures to reduce noise emissions; establish communication system to resolve noise complaints, if any; and conduct noise monitoring during construction, as necessary.

Table 19-14 Potential Construction Phase Mitigation Measures for Noise

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in existing sound levels	Noise emissions from equipment and vehicles used to construct the facility (stationary, limited to facility site)	• Construction activities will be limited to the daytime period. • Ensure that noise abatement equipment on vehicles and machinery is maintained in good working order. • Minimize vehicle and equipment idling. • Residents near to construction noise-generating activities will be notified prior to construction. • A complaint response procedure will be implemented to address noise complaints should they arise.
	Noise emissions from equipment and vehicles used to construct linear Project components and from vehicles travelling to/from construction sites (transient)	

Operation

Mitigation measures that may be implemented during operation to address potential effects on the acoustic environment are listed in Table 19.15 and are typical to facility operations projects. As engineering progresses, further mitigation measures, including Project-specific mitigation measures, may be developed.

Table 19-15 Potential Operations Phase Mitigation Measures for Noise

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in existing sound levels	Noise emissions from operation of the CCGT and ICCF (stationary, limited to facility site)	• Enclosers will be used on equipment to reduce noise emissions. • Noise reduction features on Project equipment. • Incorporating noise attenuation measures on air cooled condensers and/or air-cooled heat exchangers during design. This may include, but is not limited to, reducing fan speed, using low-noise fan blades, and/or adding acoustic materials. • Incorporating noise attenuation measures on the CO_2 capture gas turbine exhaust pathway equipment which may include sound insulation and/or inline silencers, as required.

Abandonment

Mitigation measures similar to those implemented during construction would be employed during decommissioning or abandonment activities to reduce potential effects on the acoustic environment.

19.4 Groundwater

19.4.1 Effect Pathways

Construction

The Project is located in the Upper Athabasca River sub-watershed (GOA 2018) and the Athabasca River influences the groundwater aquifer potential in the Project area. The PGF site is underlain by the Scollard Formation, while the pipelines and transmission line are likely underlain by either the Paskapoo Formation or the Scollard Formation (Prior et al. 2013). Unconsolidated sediment thickness throughout the area includes eolian or windblown sand with silt deposits, with fluvial incised deposits from the Athabasca River. Groundwater in the Project area is mapped as relatively high and the potential for interaction with excavation from Project construction of the power plant, pipelines, and transmission line has the potential to occur.

During construction of the PGF, pipelines, and transmission line, the Project has the potential to change groundwater quantity and quality as a result of drilling of extraction wells, excavation and potential dewatering activities, and from accidental spills in areas where groundwater is shallow. Table 19.16 summarizes the potential effects and pathways that may occur, and which are typical of power plant, pipeline, and transmission line construction projects.

Table 19-16 Potential Construction Phase Effects on Groundwater

Potential Effects and Pathways		Project Component		
Potential Effect	**Effect Pathways**	**PGF**	**Power Transmission Line**	**Natural Gas & CO_2 Pipeline**
Change in groundwater quality or quantity	Disturbance to soil and parent material above or below the water table may change physical hydraulic properties	✓	✓	✓
	Alteration of shallow groundwater levels or flow rates through drilling of extraction wells, dewatering or horizontal directional drilling (HDD)	✓	✓	✓
	Disturbance of pre-existing contamination (if discovered)	✓	-	-
	Accidental spills	✓	✓	✓

Operation

Table 19.17 summarizes the potential effects and pathways that may occur, and which are typical of facility operations.

Table 19-17 Potential Operational Phase Effects on Groundwater

Potential Effects and Pathways		Project Component		
Potential Effect	**Effect Pathways**	**PGF**	**Power Transmission Line**	**Natural Gas & CO_2 Pipeline**
Change in groundwater quality or quantity	Alteration of shallow groundwater levels through water diversions	✓	-	-
	Accidental spills	✓	-	-

During operation of the PGF, the Project has the potential to result in a change to groundwater quantity as CCGT make up water supply for the operation of the PGF could include groundwater diversion. A change in groundwater quality could also occur as a result of accidental spills during operation, although the effects of accidental spills is expected to be limited based on the planned design and operation of the facility and types of fluids within the PGF.

Desktop evaluation of the on-site aquifer potential is limited, but based on existing information likely yields are expected to be approximately 9 m^3/hr (40 US gpm) based on the water approval granted to the current pit operator for washing water. This constitutes approximately a quarter of the overall system requirements of approximately 36 m^3/hr (160 US gpm). Therefore, off-site groundwater exploration/development is necessary to obtain the water requirements via a groundwater source well or wells. Preliminary analysis of the region indicates that there is significant aquifer potential nearby to the PGF, particularly in the floodplain areas downstream (south and east) of the PGF.

Within the floodplain areas, which are mapped as fluvial sand and gravel immediately overlying bedrock, there is a fully saturated, unconfined sand and gravel aquifer in hydraulic communication with both the Athabasca and Sakwatamau Rivers and associated fluvial sediments. The aquifer demonstrates very high transmissivity /aquifer yield based on an established Groundwater Authorization for 109 m^3/hr (480 US gpm). Groundwater diversion at 109 m^3/hr (480 US gpm) are not expected to impact water levels in the Athabasca or Sakwatamau rivers, given the capacity of both these water bodies. Floodplain areas therefore constitute the primary aquifer target given its established high yield capacity, and likely connection to significant regional surface water resources.

Process water and surface water runoff, as described in Section 24.4, will not interact with groundwater during operations. Process water will be recycled to the extent possible in the operation of the PGF 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. Surface water runoff will be collected and managed for the PGF in a stormwater management pond, as described below in Section 19.7 and Appendix E.

Following completion of pipeline and transmission line construction and post-construction reclamation activities, no new operations phase effects on groundwater are anticipated.

Decommissioning/Abandonment

A neutral effect on groundwater may occur when the PGF is decommissioned as groundwater diversion will cease.

With regards to the pipelines and transmission line, typical decommissioning or abandonment activities involve limited ground disturbance, which might temporarily affect groundwater within the ROWs where dewatering or excavation occurs. Effects would be limited to short duration and any dewatered groundwater would be expected to be discharged to the surface where it would likely infiltrate back into the ground.

19.4.2 Mitigation

Construction

Standard construction practices and best management plans will be implemented during dewatering as effective mitigation measures to limit disturbances to the local groundwater system. Mitigation measures that may be implemented during construction to address potential effects on groundwater are listed in Table 19.18 and are typical to power plant, pipeline, and transmission line construction projects.

Table 19-18 Potential Construction Phase Mitigation Measures for Groundwater

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in groundwater quality or quantity	Disturbance to soil and parent material above or below the water table may change physical hydraulic properties	• Monitor water levels in all open excavations. • Limit the amount of time that a trench is left open. • Discharge water away from drainage courses, water bodies and wetlands; appropriate locations for discharge will be identified during construction by a qualified environmental monitor • Monitor the water discharge site for signs of erosion, saturation of the discharge site or flow off of the approved release area. Suspend dewatering and apply erosion control measures, reduce the flow or move the discharge site if it appears that the above effects are occurring. • Drilling and licensing of the groundwater well will be in compliance with the terms and conditions of the *Water Act* approval and the Guide to Groundwater Authorization (GOA 2023).
	Alteration of shallow groundwater levels or flow rates through dewatering or boring/horizontal directional drilling	
	Disturbance of pre-existing contamination (if discovered)	• In the event that contaminated or potentially contaminated soil or water is encountered, implement contamination management and contingency plans.
	Accidental spills	• Develop and implement procedures to manage the risk of spills. • In the event of a spill, efforts to contain, remove or remediate any contaminant(s) causing environmental effects shall be completed. • Spill response procedures and reporting will be completed in conformance with applicable federal and provincial requirements. • Secondary containment will be used for refueling and spill trays will be placed under stationary equipment located in areas where groundwater is close to surface.

Mitigation measures that will be implemented during construction to address potential effects on groundwater are typical to construction projects that include excavation. Limited excavation will occur at the PGF, as the site has been used for natural resources extraction and will likely require fill to level the site for construction. Dewatering during construction for the pipelines, if necessary, will be temporary and will follow best management practices for construction dewatering, as identified in the mitigation measures.

Following implementation of mitigation measures, Project construction will have no measurable effects on groundwater.

Operation

Mitigation measures during the operations phase include monitoring of the groundwater network both for potential contaminants related to operation of the PGF and to limiting the groundwater withdrawal to the calculated rate for consumption.

Whitecourt Power, an existing biomass power generation facility located approximately 4.2 km SE from the PGF, has an existing *Water Act* approval to withdraw groundwater, additional development in the same aquifer will require additional testing to confirm that no effects on existing water users will result. This process involves testing and monitoring of new wells, interpreting the pumping response and determining the effects on established groundwater users in the area.

Decommissioning/Abandonment

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

19.5 Soils

19.5.1 Effect Pathways

Construction

The Project area overlaps the Gray Luvisols of the Upper and Lower Foothills Natural Regions and Subregions of Alberta (Ecological Stratification Working Group 1995). Luvisols are a forest soils that form in medium and fine textured parent materials (Canadian Society of Soil Science 2020). The Facility site is largely disturbed, and sand and gravel extraction has occurred over 90% of the site, so little to no topsoil or subsoil is present. The natural gas pipeline, CO_2 pipeline, and power transmission line will cross a variety of luvisol-dominated mineral soils and organic soils associated with depressional areas and watercourses. No solonetzic soils are anticipated to occur in the PGF or pipeline ROWs.

Limited effects on native soils associated with construction of the PGF are anticipated as the majority of the site has been stripped during quarrying and only a small patch of undisturbed land remains.

During construction of the pipelines, soil will be stripped and stockpiled in rows along the ROWs. For the transmission line, soil disturbance will be limited to areas where there are towers, or other infrastructure. These soils will be stockpiled for reclamation.

Table 19.19 summarizes the potential effects and pathways that may occur, and which are typical of power plant, pipeline, and transmission line construction projects.

Table 19-19 Potential Construction Phase Effects on Soils

Potential Effects and Pathways		Project Component		
Potential Effect	**Effect Pathways**	**PGF**	**Power Transmission Line**	**Natural Gas & CO_2 Pipeline**
Change in soil quality	Compaction, rutting, admixing or loss of soil structure through vehicle and equipment movement	-	✓	✓
	Soil loss through wind and water erosion following vegetation clearing and grading	-	✓	✓
	Disturbance of pre-existing contamination (if discovered)	✓	-	-
	Accidental spills	✓	✓	✓

Operation

Following completion of PGF, pipeline and transmission line construction and post-construction reclamation of the pipeline and transmission line ROWs, no effects on soil are anticipated.

Decommissioning/Abandonment

An adverse effect on soil may occur where the PGF is removed and the site is restored, as soil loss through erosion or previous site uses may have occurred prior to the Project initiation, leaving less soil for final reclamation.

With regard to the pipelines and transmission line, typical decommissioning or abandonment activities involve vehicle movement and ground disturbance, which might temporarily affect soils within the ROWs, however these would be managed through proven soil handling measures and over a short term that the change would be negligible.

19.5.2 Mitigation

Construction

Mitigation measures that will be implemented during construction to address potential effects on soil are proven soil handling and best management practices for construction projects.

Mitigation measures that may be implemented during construction to address potential effects on soil are listed in Table 19.20 and are typical to power plant, pipeline, and transmission line construction projects.

Table 19-20 Potential Construction Phase Mitigation Measures for Soils

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in soil quality	Compaction, rutting, admixing or loss of soil structure through vehicle and equipment movement	• Activities will be restricted to the Project footprint to minimize soil disturbance. • Topsoil and subsoil will be stockpiled separately with a minimum 1 m between stockpiles. • Topsoil will be stockpiled on topsoil, subsoil on subsoil or on top of a geotextile barrier to prevent admixing. • Soil handling will be limited when soils are extremely wet to prevent compaction and loss of soil structure. • Subsoil will be replaced over the spoil material maintaining natural site contours and drainage patterns. • Prior to topsoil replacement alleviate compaction from the subsoil, and smooth and level the subsoil to prevent admixing with topsoil. • Disc or cultivate topsoil following replacement. • Wetland soils will be stripped during dry or frozen conditions, stockpiled separately from other soil stockpiles and returned to the wetland they were removed from whenever possible.
	Soil loss through wind and water erosion following vegetation clearing and grading	• Soil stockpiles will not exceed a 3:1 ratio to limit erosion potential. • Erosion and sediment control measures will be installed to protect soil from erosion and prevent sedimentation. • Revegetation will occur as soon as possible following soil replacement, or soil will be covered in protective matting to limit soil loss while vegetation is re-established.
	Disturbance of pre-existing contamination (if discovered)	• In the event that contaminated, or potentially contaminated soil or water is encountered, implement contamination management and contingency plans.
	Accidental spills	• Develop and implement procedures to manage the risk of spills. • In the event of a spill, efforts to contain, remove or remediate any contaminant(s) causing environmental effects shall be completed.

Following implementation of mitigation measures, Project construction is not anticipated to have adverse effects on soil where they are disturbed.

Operation

No additional mitigation measures are required as no operations phase effects on soil are anticipated.

Decommissioning/Abandonment

Mitigation measures similar to those implemented during construction would be employed during decommissioning or abandonment activities to reduce potential effects on soil, limited to the PGF and transmission line, as pipelines would be abandoned in place.

19.6 Vegetation and Wetlands

19.6.1 Effect Pathways

Construction

The Project is located in the Lower Foothills and Central Mixedwood Natural Subregions of Alberta (Natural Regions Committee 2006). The PGF site is largely located within a quarry; as a result, little native vegetation is within the site, though a small area of remnant deciduous and conifer trees may be present; no wetlands are present within the PGF site. The natural gas pipeline, CO_2 pipeline, and power transmission line will cross a variety of upland vegetation types, including coniferous, deciduous and mixedwood forest, shrubland and riparian vegetation associated with watercourses. While there are no known wetlands within the PGF site, wetlands will be crossed by the natural gas pipeline, CO_2 pipeline and power transmission line. No federally-listed vegetation species at risk are known to occur in the Project area.

Limited effects on native vegetation and wetlands associated with construction of the PGF are anticipated as the majority of the site has been stripped during quarrying and only a small patch of native vegetation remains.

During construction of the pipelines and transmission line, natural vegetation will be cleared, and wetlands may be temporarily disturbed. Table 19.21 summarizes the potential effects and pathways that may occur, and which are typical of pipeline and transmission line construction projects.

Table 19-21 Potential Construction Phase Effects on Vegetation and Wetlands

Potential Effects and Pathways		Project Component		
Potential Effect	Effect Pathways	PGF	Power Transmission Line	Natural Gas & CO_2 Pipeline
Change in vegetation communities and species	Direct loss and/or alteration of native vegetation communities or plant species of management concern (including species at risk) arising from clearing and ground disturbance	✓	✓	✓
	Indirect change in vegetation communities or species through weed introduction and spread from vehicle and equipment movement	✓	✓	✓
Change in wetlands	Alteration or loss of wetland vegetation arising from vegetation clearing and ground disturbance	-	-	✓
	Change in hydrological regime, storage capacity or overall function	-	-	✓

Operation

Following completion of PGF, pipeline and transmission line construction and post-construction reclamation of the pipeline and transmission line ROWs, no new operations phase effects on native vegetation and wetlands are anticipated.

Decommissioning/Abandonment

A net positive effect on vegetation may occur where the PGF is removed, and the site is restored.

With regard to the pipelines and transmission line, typical decommissioning or abandonment activities involve vehicle movement and ground disturbance, which might temporarily affect vegetation and wetland communities within the ROWs. A net positive effect on vegetation may occur when vegetation management under active power lines and overactive pipelines ceases following abandonment.

19.6.2 Rare Plant Vegetation Surveys

One vascular plant species tracked by ACIMS was found during the early rare plant surveys (June 2023) and was confirmed during the second visit for the late rare plant survey (August 2023). No new occurrences of federally or provincially listed SARA or Ecological Communities of Conservation Concern (ECCC) were found during the late rare plant survey.

Ten individual trees of Stika willow (*Salix sitchensis*) were identified during the survey along the transmission line ROW (Figure 19.2). Stika willow (*Salix sitchensis*) is provincially ranked by ACIMS as S2. The individual trees were observed within a 5 m x 5 m area at survey site RP22 in June 2023 located on a riparian area along a creek side (Figure 19.2). Other native plant species present on site included other willow species (*Salix sp.*), river alder (*Alnus incana spp. tenuifolia*), balsam poplar (*Populus balsamifera*) and choke cherry (*Prunus virginiana*). Stika willow is a large dioecious shrub or tree, which can grow up to 8 m tall and is typically found along floodplains, moist forest thickets, along creeks margins and lakeshores (Flora of British Columbia 2020).

Mitigation measures that may be implemented during construction to address potential effects on rare plant species are listed in Table 19.22 below.

19.6.3 Mitigation

Construction

Mitigation measures that may be implemented during construction to address potential effects on native vegetation and wetlands are listed in Table 19.22 and are typical to pipeline and transmission line construction projects. As Project planning progresses, further mitigation measures, including site-specific mitigation measures for sensitive resources, will be developed.

Table 19-22 Potential Construction Phase Mitigation Measures for Vegetation and Wetlands

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in vegetation communities and species	Direct loss and/or alteration of native vegetation communities or plant species of management concern (including species at risk) arising from clearing and ground disturbance	• Activities will be restricted to the Project footprint to limit vegetation loss. • No clearing or grubbing beyond the marked construction temporary workspace boundaries. • Where grading is not necessary, implement minimum surface disturbance techniques to assist in maintaining an intact ground surface. • Limit clearing of trees at watercourse crossings to the area required to complete the construction. • Where practical, leave stumps in place, particularly on streambanks, to provide surface stability. • Salvage merchantable timber according to the requirements of the forest management agreement holder. • Reclaim disturbed areas according to requirements of the land manager. This may include natural revegetation, seeding and/or shrub staking. • Areas with rare plant species will be avoided through alterations to the right of way, if necessary. • Areas containing rare plant species will be visibly marked (e.g., flagged, fenced, staked, etc.) in a manner sufficient to prevent inadvertent activity from occurring in these areas. • If previously unidentified ECCC are found within the construction footprint prior to or during construction, retain a qualified biologist to provide mitigation recommendations including relocation of species or avoidance measures. A contingency plan may be implemented.
	Indirect change in vegetation communities or species through weed introduction and spread from vehicle and equipment movement	• Ensure all equipment (e.g., vehicles, materials, swamp mats, etc.) arrives for work in a clean condition to reduce the risk of weed introduction. • Flag areas previously identified as having noxious and invasive weed infestations before commencement of site preparation (i.e., clearing, topsoil salvaging, grading) activities. • During construction, monitor topsoil windrows for weed growth during nonfrozen soil conditions and implement corrective measures, if warranted.

Table 19-22 Potential Construction Phase Mitigation Measures for Vegetation and Wetlands

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in wetlands	Alteration or loss of wetland vegetation arising from vegetation clearing and ground disturbance Change in hydrological regime, storage capacity or overall function	• Mark wetland boundaries prior to clearing. • Avoid disturbance to wetlands and minimize vegetation removal in wetlands to the extent possible. • Minimize grading within wetland boundary. Do not use temporary workspace within the boundaries of wetlands, unless required for site specific purposes. • Do not refuel vehicles or equipment within 100 m of wetlands. Refueling will be done within secondary containment and spill kits will be located at refueling locations to address accidental spills or leaks. • Spill response procedures and reporting will be completed in conformance with applicable federal and provincial requirements. • If ground conditions are encountered that create potential for rutting, admixing or compaction, minimize ground disturbance using a protective layer (e.g., frost packing, snow, ice, geotextile and fill, rig mats, swamp mats, or access mats). • Use berms, cross ditches, sediment fencing and/or other appropriate measures to prevent erosion and siltation into adjacent wetland areas. • To facilitate restoration of cross right-of-way drainage, replace trench material as soon as feasible and re-establish pre-construction contours within the wetland boundary. • Natural recovery is the preferred method of reclamation in wetlands.

Following implementation of mitigation measures, Project construction will have temporary residual adverse effects on native vegetation and wetlands where they are cleared and disturbed; however, these effects are reversible following reclamation.

Operation

No additional mitigation measures are required as no operations phase effects on native vegetation and wetlands are anticipated.

Decommissioning/Abandonment

Mitigation measures similar to those implemented during construction would be employed during decommissioning or abandonment activities to reduce potential temporary residual effects on native vegetation and wetlands, limited to the PGF and transmission line, as pipelines would be abandoned in place. Potential residual effects are reversible following reclamation for vegetation.

19.7 Surface Water and Fish and Fish Habitat

19.7.1 Effect Pathways

Construction

The PGF site is located approximately 800 m north of the Athabasca River, which is the closest watercourse. As there are no watercourses in proximity to the PGF site, construction of the PGF will not result in direct or indirect effects to surface water and fish or fish habitat.

The natural gas pipeline will cross the Athabasca River and its tributaries, including Chickadee Creek. Where the transmission line crosses the Sakwatamau River and the Athabasca River and its tributaries there will be no instream works. Transmission line support structures will be placed outside of the high-water mark and the power lines will be suspended overhead.

Where the natural gas pipeline crosses the Athabasca River, or other smaller watercourses, it will be installed using a trenchless method (e.g., horizontal directional drill (HDD)). Trenchless crossing activities would be completed above the high-water mark with no proposed instream works, and pipelines will be installed by HDD to appropriate depths to limit potential effects to the water courses, including surface water quality and fish and fish habitat. Erosion and sediment control measures will be implemented during construction to direct surface water flows away from construction and to limit the potential for deleterious material from entering the water courses the work is being conducted near. Fish and fish habitat assessments will be completed prior to construction to identify potential effects that may occur during construction (frac-out during HDD for pipelines) and appropriate mitigation measures that will be implemented to reduce any potential effects, including using the Fisheries and Oceans Canada (DFO) Pathways of Effects approach and standard mitigation measures for projects near water. As a result, there are no direct or indirect effects on fish or fish habitat at these crossing locations anticipated.

Where the pipelines cross tributaries to the Athabasca River that are not mapped as critical habitat, crossings may be installed using trenched methods (i.e., isolated crossings if flowing and open cut if dry or frozen to bottom). An isolated trenched crossing method involves the direct excavation of a trench through the bed and banks of a watercourse while isolating the instream work area from flowing water. Water flow is maintained through diversion methods such as a flume, dam and pump, or diversion channel. A dry or frozen to bottom open cut pipeline crossing method involves the direct excavation of a trench through the bed and banks of a watercourse. All crossing locations will be assessed for fish and fish habitat, prior to finalizing crossing methods and to identify potential effects and appropriate mitigation. The use of DFO's Pathways of Effects approach to determine potential effects and to identify additional site-specific avoidance and mitigation measures that can be implemented utilizing the standard measures to avoid and mitigate impacts to fish and fish habitat, and aquatic species at risk will be done when crossing locations have been identified. Potential effects to surface water quality and quantity at locations that are considered for trenched crossings will be evaluated at a site-specific level, however, through established best management practices and mitigation measures such as erosion and sediment controls, temporary redirection of surface flows and construction timing, the avoidance of direct effects to surface water quality and quantity and downstream users can be managed.

No new permanent or temporary vehicle/equipment crossings will be constructed across the Athabasca River. Where the pipelines and transmission line cross tributaries to the Athabasca River, temporary vehicle/equipment watercourse crossings will consist of a clear-span bridge, or ice bridge and snow fill during frozen conditions.

During construction, temporary water diversions may be required to support activities such as freezing in of roads and watercourse crossings and hydrotesting of pipelines.

Table 19.23 summarizes the potential effects and pathways that may occur, and which are typical of pipeline and transmission line construction projects.

Table 19-23 Potential Construction Phase Effects on Surface Water, Fish and Fish Habitat

Potential Effects and Pathways		Project Component		
Potential Effect	**Effect Pathways**	**PGF**	**Power Transmission Line**	**Natural Gas & CO_2 Pipeline**
Change in surface water quality	Increased sediment concentrations and transport in surface water due to instream construction, vegetation clearing, increased erosion on the Project footprint, or release of hydrostatic test water	-	-	✓
Change in surface water quantity	Construction activity on land adjacent to waterbodies resulting in changes in natural flow patterns	-	✓	✓
	Trenching could affect flow at watercourse crossings	-	-	✓
	Temporary diversions (for hydrostatic testing, access development, dust control) or release of water	-	-	✓
Change in fish habitat (including critical habitat for species at risk)	Instream construction resulting in changes to habitat structure (i.e., substrate, banks, and riparian vegetation)	-	✓	✓
	Construction activity on land adjacent to watercourses resulting in changes to bank stability, temporary loss of riparian habitat, sedimentation, or in increased erosion potential	-	✓	✓
	Temporary diversions (for hydrostatic testing, access development, dust control) or release of water resulting in changes to habitat	-	-	✓
Change in fish mortality risk	Mobilization and transport of sediment resulting in fish mortality from gill abrasion and/or limited foraging ability, or mortality of fish eggs	-	✓	✓
	Change in timing, duration and frequency of flow (including during isolation of crossings and temporary diversions), resulting in fish mortality by stranding, entraining or impinging fish, or by preventing access to spawning areas	-	✓	✓
	Destruction of fish and/or eggs during instream work	-	-	✓
	Introduction or spread of whirling disease	-	-	✓

Operation

Following completion of the PGF, pipeline, and transmission line construction and post-construction reclamation, no new operation phase effects on surface water, fish or fish habitat are anticipated. ROWs for the natural gas and CO2 pipelines and the transmission line will be put back to pre-disturbance conditions for drainage patterns, and thus surface water quantities will not change within these Project areas. Surface water quality will also not be affected by the operation of buried pipelines or overhead powerlines. There are no anticipated effects to surface water or fish and fish habitat based on water use for Project operations and with the planned source water (see Section 9.2 for further information on source water and Section 19.4 for potential effects on groundwater).

Potential effects to surface water (quantity and quality) during operations is limited to water discharge from the operation of the PGF stormwater management facility (SWMF), see Appendix E for the Stormwater Management Concept Plan. As the site is currently an active gravel quarry, the surface water that falls from precipitation, currently flows over the site and either infiltrates into the ground or follows swales and berms to the stormwater pond for the site. During construction, the site will be recontoured and ditching, berms and swales will be used to direct surface water flows from runoff to the SWMF for the PGF. The proposed SWMF will require about 15,000 m^3 of active storage volume for the 100-year 24-hour rainfall event. Depending on the site grading, a pumping system will likely be required to discharge the water from the SWMF to the final outlet for off-site release, including the preferred option, to the existing natural drainage channel (vegetated pathway) north of the PGF that conveys existing overland drainage in the area eastward. Water will infiltrate into the ground as it previously flowed in this pathway prior to the existing disturbance in the area. Pumping rate from the SWMF will be limited to a pre-development release rate from the 5-year 24-hour rainfall event which is 57.3 L/s (2.9 L/s/ha). The SWMF will be lined either with a synthetic or clay liner to prevent groundwater interactions and the runoff will be tested prior to release. There are no anticipated contaminants that will enter surface water flows that would affect the water quality and collected into the SWMF. The proposed SWMF is expected to capture at least 85% of particles coarser than 75 microns as per the Provincial water quality guideline requirement. A minimum 1.0 m deep permanent water depth is recommended to avoid re-suspension of settled particles during the drawdown operations. No unmitigated flows will be directed towards the Athabasca River and therefore no potential effects from the Project will result from the operation of the SWMF to surface water quality or quantity during operations of the Project.

Decommissioning/Abandonment

No effects on surface water, fish or fish habitat would be anticipated as a result of PGF decommissioning and abandonment activities as the activities would be limited to removal of equipment and recontouring of the site to follow natural topography in the area and reclaimed to natural habitat.

Pipelines are expected to be abandoned in-place under watercourses; as a result, no direct effects on watercourses would be anticipated. Typical decommissioning or abandonment activities for the pipelines and transmission line would likely involve vehicle/equipment movement to complete abandonment activities, which might temporarily affect surface water, fish and fish habitat at temporary crossings.

19.7.2 Mitigation

Construction

Mitigation measures that will be implemented during construction to address potential effects on surface water, fish and fish habitat are typical to pipeline and transmission line construction projects include the following.

Table 19-24 Potential Construction Phase Mitigation Measures for Surface Water, Fish and Fish Habitat

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in surface water quality	Increased sediment concentrations and transport in surface water due to instream construction, vegetation clearing, increased erosion on the Project footprint, or release of hydrostatic test water	• Develop and implement an erosion and sediment control plan that reduces the risks of sedimentation into crossed watercourses during construction. Maintain erosion and sediment control measures until disturbed ground has been stabilized, suspended sediment has resettled to the bed of the waterbody, and runoff water is clear. • Delay grading of the primary banks of watercourses and water bodies until immediately before construction of temporary crossings and watercourse realignment, where practicable. • Spill containment kits must be present on site in designated locations where risk of spill is deemed the greatest (e.g., refueling areas). • Complete dewatering in a manner that does not cause erosion or allow sediment to re-enter a watercourse or water body through the use of appropriate sediment control devices.
Change in surface water quantity	Construction activity on land adjacent to waterbodies resulting in changes in natural flow patterns Trenching could affect flow at watercourse crossings	• Maintain natural drainage patterns to the extent possible • Maintain downstream drainage for surface flows through swales, breaks in berms and grading during construction. Recontour disturbed areas to match pre-disturbance grading and patterns. • Use pumps to divert watercourses during temporary isolation crossings to maintain water flows. • Do not store hazardous materials, chemicals, fuels or lubricants within 100 m of watercourses. Suitably berm such storage areas. Store fuel containers within containment berms constructed to a capacity of 110% of the fuel stored.

Table 19-24 Potential Construction Phase Mitigation Measures for Surface Water, Fish and Fish Habitat

<table>
<tr><th colspan="2">Potential Effects and Pathways</th><th rowspan="2">Mitigation Measures</th></tr>
<tr><th>Potential Effect</th><th>Effect Pathways</th></tr>
<tr><td rowspan="2">Change in fish habitat (including critical habitat for species at risk)</td><td>Instream construction resulting in changes to habitat structure (i.e., substrate, banks, and riparian vegetation)</td><td rowspan="2">• Before isolation and dewatering works commence, retain a QAES to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within the isolation and safely relocate them to an appropriate location. A Fish Research Licence (FRL) will be obtained from the Environmental Protection Agency (EPA) prior to commencement of construction activities.
• Pump sediment-laden water into a vegetated area and prevent sediment and other deleterious substances from entering watercourses.
• Sump pump installation within excavation area to capture seepage.</td></tr>
<tr><td>Temporary diversions (for hydrostatic testing, access development, dust control) or release of water resulting in changes to habitat</td></tr>
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Table 19-24 Potential Construction Phase Mitigation Measures for Surface Water, Fish and Fish Habitat

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in fish habitat (including critical habitat for species at risk) (cont'd)		• Protect pump discharge area(s) with diffuser to prevent erosion and the release of suspended sediments downstream and remove when the works have been completed. • Screen any water intake pipes to prevent entrainment or impingement of fish. In freshwater, follow these measures for design and installation of intake end-of-pipe fish screens to protect fish where water is extracted from fish-bearing waters: - Adhere to DFO's Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater. - Provisions should be made for the removal, inspection and cleaning of screens. - Conduct regular maintenance and repair of cleaning apparatus, seals and screens to prevent debris-fouling and impingement of fish. - Pumps will be shut down when fish screens are removed for inspection and cleaning. - When removing the isolation, gradually remove the downstream dam first in order to equalize water levels inside and outside of the isolated area and to allow for suspended sediments to settle prior to removing the upstream dam.
	Construction activity on land adjacent to watercourses resulting in changes to bank stability, temporary loss of riparian habitat, sedimentation, or in increased erosion potential	• Design and construct approaches to the waterbody such that they are perpendicular to the waterbody to minimize loss or disturbance to riparian vegetation. • Keep clearing of riparian vegetation to only what is needed to construct the Project; use existing trails and roads wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting. • Do not use herbicides for clearing or maintenance of riparian vegetation unless approved by DFO. Do not remove riparian vegetation if the riparian area is identified as part of critical habitat of an aquatic listed species at risk unless authorized by DFO

Table 19-24 Potential Construction Phase Mitigation Measures for Surface Water, Fish and Fish Habitat

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in fish mortality risk	Mobilization and transport of sediment resulting in fish mortality from gill abrasion and/or limited foraging ability, or mortality of fish eggs Destruction of fish and/or eggs during instream work	• Develop and implement an erosion and sediment control plan that reduces the risks of sedimentation into crossed watercourses during construction. Maintain erosion and sediment control measures until disturbed ground has been stabilized, suspended sediment has resettled to the bed of the waterbody, and runoff water is clear. The plan will include, but not limited to, the following practices where applicable: - Reduce duration of in-water work. - Prohibit in-water excavation unless a turbidity curtain or isolation is installed. - Temporarily suspend work in the event of weather that could increase the potential for erosion and sedimentation. - Install effective erosion and sediment control measures before starting work to prevent sediment from entering the watercourse. - Use clean materials for construction, free of fines and debris. - Regularly inspect and maintain erosion and sediment control measures and structures during construction. - Repair erosion and sediment control measures and structures if damage occurs. - Remove non-biodegradable erosion and sediment control materials once the site is revegetate and stabilized. - Limit disturbance of the banks, and stabilize and reclaim the site to pre-construction conditions, as soon as possible after construction. • Machinery will arrive on site in a clean condition and maintained free of fluid leaks, invasive species and noxious weeds. • Develop and implement a Containment and Spill Management Plan that minimizes risk of accidental spills or releases from entering watercourses during construction • Use a biodegradable hydraulic fluid for equipment when working below the Normal Water Level (NWL). • Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent deleterious substances from entering the water. • Remove construction materials from site upon construction completion.

Table 19-24 Potential Construction Phase Mitigation Measures for Surface Water, Fish and Fish Habitat

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in fish mortality risk (con't)	Change in timing, duration and frequency of flow (including during isolation of crossings and temporary diversions), resulting in fish mortality by stranding, entraining or impinging fish, or by preventing access to spawning areas	• Minimize the duration of work below the Normal Water Level. • Minimize the duration of in-water work and conduct in-water work during periods of low water levels where possible to reduce the risk to fish and their habitat. • Conduct work outside of the restricted activity period (RAP) and during periods of low flow in order to complete works in dry conditions. • Schedule work to avoid wet, windy, and rainy periods to reduce the risk of erosion and sedimentation.
	Introduction or spread of whirling disease	• Machinery will arrive on site in a clean condition and maintained free of fluid leaks, invasive species and noxious weeds.

Implement measures associated with the following federal and provincial guidance, as appropriate:

- Interim Code of Practice: End-of-pipe fish protection screens for small water intakes in freshwater (DFO 2020a)
- Interim Code of Practice: Temporary Cofferdams and Diversion Channels (DFO 2020b)
- Code of Practice: Clear span bridges (DFO 2022b)
- Code of Practice: Ice bridges and snow fills (DFO 2022c)
- Code of Practice of Pipelines and Telecommunication Lines Crossing a Water Body (GOA 2013)
- Code of Practice for Watercourse Crossings (GOA 2019b)
- Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines (AENV 1999b)
- Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines (AENV 1999c)

As project planning progresses, further mitigation measures, including site-specific preferred and contingency crossing methods for pipelines and vehicles/equipment, will be developed.

Pipeline construction activities and temporary vehicle/equipment crossings will be reviewed by a Qualified Aquatic Environmental Specialist to assess the likelihood of Project activities to result in harmful alteration, disruption, or destruction (HADD) of fish habitat or the death of fish and appropriate mitigation measures will be designed and implemented to reduce these potential effects when final pipeline crossings are identified. All pipeline watercourse crossings, including the Athabasca River and the

Chickadee Creek (if necessary) will be completed by trenchless methods. Crossings will be set back from the watercourse edge to adequately reduce the potential for adverse effects to deleterious sediments from entering the watercourses, resulting in adverse effects to fish and fish habitat. Any trenchless crossings of the Athabasca River or other watercourses will be of sufficient depth such that vibration from the drill will not result in effects to fish and fish habitat. Due to the presence of mapped critical habitat for Athabasca rainbow trout and the potential for instream and riparian area disturbance, a request for review will be submitted to DFO prior to construction activities to avoid non-compliance with the *Fisheries Act* and SARA.

Pipeline crossings will include temporary access restrictions based on construction to the crossing location and appropriate upstream and downstream setbacks. During these times, fishing by the public or Indigenous nations would be restricted. Communication protocols will be developed to allow for notification of interested parties of all activities that are occurring in the area. As construction is temporary, effects to Indigenous nations would be temporary. No long-term changes in land use or fish availability are anticipated.

Following implementation of mitigation measures, Project construction could have limited residual effects on water quality and fish and fish habitat that would be low in magnitude, local to crossing locations, occur as a single event and be reversible.

Operation

No additional mitigation measures are required as no operations phase effects on surface water, fish and fish habitat are anticipated. Process water from the operation of the PGF is described below in Section 24.3 and will be contained in a closed loop system (or exhausted through a cooling tower) and stored in appropriate tankage on site prior to disposal to an approved location. Therefore, no interactions with surface water or fish and fish habitat will occur.

As described in Section 24.3 and 9.1, the stormwater pond will be designed to collect surface water runoff from the PGF area for the 1 in 25-year event. The stormwater pond will be constructed with appropriate liners for the retention of liquids or compacted material to retain water and prevent leaching of water into local underlying soil, groundwater, or unmitigated flow offsite. Water will be released from the pond as required, in compliance with the EPEA water quality standards (GOA 2018) and the conditions of the Project’s operating approval. Water could also be stored in the ditch system leading to the pond, and excess water slowly released to the pond as the space becomes available. Should the water not meet these standards, MIL would pump the water into a truck for it to either be treated or disposed of at an offsite disposal site. The release of stormwater will be designed to maintain existing drainage patterns so adjacent lands are not affected.

Decommissioning/Abandonment

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

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

19.8.1 Effect Pathways

Construction

The Project falls within the range of distribution of species protected under SARA (GOC 2023) and the MBCA (i.e., Migratory Birds) and within Migratory Bird Nesting Zone B5. It is also partially within a KWBZ associated with the Athabasca River valley, core and secondary grizzly bear ranges, and may be within 500 m of a provincially-designated trumpeter swan waterbody. It is not within areas mapped as critical habitat for SARA-listed wildlife species. There is potential for interactions with species at risk during Project construction and operation if suitable habitat is available.

The PGF site is largely located within a quarry; as a result, it is unlikely that it contains high quality habitat for wildlife, including species at risk and migratory birds. The natural gas pipeline, CO_2 pipeline, and power transmission line will cross a variety of upland habitat types, including coniferous, deciduous and mixedwood forest, shrubland and riparian vegetation associated with watercourses. While there are no known wetlands within the PGF site, wetlands will be crossed by the natural gas pipeline, CO_2 pipeline and power transmission line.

Limited effects on wildlife habitat associated with construction of the PGF are anticipated as the majority of the site has been stripped during quarrying and only a small patch of native vegetation remains. During removal of vegetation, emissions from equipment and vehicles could result in potential atmospheric emissions (fugitive emissions/dust) that also may reduce habitat for foraging at the PGF, along the pipeline corridors and the transmission line. The availability of habitat in the PGF and area surrounding the PGF site is also already low due to existing industrial land use (i.e., resource extraction). However, through the implementation of mitigation measures such as vegetation removal outside of the RAP for migratory birds and species at risk, the likelihood of affecting migratory birds and species at risk is low.

During construction of the pipelines and transmission line, natural vegetation will be cleared, and wetlands may be temporarily disturbed, outside of the RAP for migratory birds and species at risk. Table 19.25 summarizes the potential effects and pathways on wildlife and wildlife habitat (including for species at risk and migratory birds) that may occur, and which are typical of power plant, pipeline, and transmission line construction projects. If construction is completed in winter, fewer species will be active (e.g., amphibians) or present (e.g., migratory birds), and so effects on wildlife would be lower in magnitude.

Table 19-25 Potential Construction Phase Effects on Wildlife and Wildlife Habitat

Potential Effects and Pathways		Project Component		
Potential Effect	**Effect Pathways**	**PGF**	**Power Transmission Line**	**Natural Gas & CO_2 Pipeline**
Change to habitat	Direct loss or alteration of habitat from vegetation removal and ground disturbance	✓	✓	✓
	Indirect loss or alteration of habitat effectiveness through sensory disturbance	✓	✓	✓
Change in movement	Alteration or impediment of wildlife movement due to physical barriers, sensory disturbance, or vegetation removal (i.e., gaps in forested habitat) associated with pipeline or compressor station construction or operation	-	✓	✓
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	✓	✓	✓

Operation

Following completion of PGF, pipeline and transmission line construction and post-construction reclamation of the pipeline and transmission line ROWs, the majority of potential effects will cease. The PGF will be graveled and void of vegetation, and thus habitat for wildlife, including species at risk and migratory birds. While migratory birds may use equipment as temporary perches, there will be no habitat or features to attract species to occupy the PGF and further, with the noise of operations, the PGF site is unlikely to be used. The SWMF within the PGF may temporarily be used by migratory birds, similarly as wetlands are used on the landscape, however, with the proximity to operational equipment and the limited availability of water within the pond (e.g., only during and immediately following storm events), there is a low likelihood of attracting species at risk and migratory birds, or other wildlife. Potential for interaction of wildlife (including species at risk and migratory birds) to come in contact with potential contaminants within the SWMF and pond are also low, as there will be limited opportunities for contaminants to be spilled or released onsite; however, secondary containment and spill responses plans will be in place to limit, if not eliminate the potential for these contaminants to reach the pond. As such, wildlife, including species at risk and migratory birds, are not expected to be adversely affected by the operation of the SWMF at the PGF. Additional mitigation measures can also be implemented, such as deterrents to prevent the use of the pond at the PGF, should it be necessary.

ROWs for both pipelines and the transmission line will be reclaimed to grasses and allowed to naturally vegetate during operation of the linear infrastructure, thus allowing for reuse by wildlife including species at risk and migratory birds. Line markers will be installed where the transmission line are within 500 metres of Trumpeter Swan lakes, as per Alberta Environment requirements.

Table 19.26 summarizes the potential effects and pathways that may occur, which are typical of facility, pipeline and transmission line operation.

Table 19-26 Potential Operations Phase Effects on Wildlife and Wildlife Habitat

Potential Effects and Pathways		Project Component		
Potential Effect	**Effect Pathways**	**PGF**	**Power Transmission Line**	**Natural Gas & CO_2 Pipeline**
Change to habitat	Indirect loss or alteration of habitat effectiveness through sensory disturbance during operations	✓	-	-
	Indirect loss or alteration of habitat effectiveness through sensory disturbance during routine maintenance	-	✓	✓
	New habitat creation (e.g., structures available to raptors and corvids as perches or for nesting)	-	✓	-
Change in mortality risk	Bird collisions with overhead lines (particularly less maneuverable species)	-	✓	-

Decommissioning/Abandonment

A net positive effect on wildlife and habitat may occur when the PGF ceases operations (i.e., cessation of sensory disturbances), and where the PGF is removed, and the site is restored. Vegetation will be re-introduced and natural vegetation will re-establish, creating habitat and areas for wildlife use, including species at risk and migratory birds, for all life cycles that may occur in the area.

With regard to the pipelines and transmission line, typical decommissioning or abandonment activities involve vehicle movement and ground disturbance, which might temporarily affect wildlife habitat and use within the ROWs and could lead to increased wildlife mortality risk. A net positive effect on habitat may occur when vegetation management under active power lines and overactive pipelines ceases following abandonment. Wildlife habitat will be re-established and use by wildlife, including species at risk and migratory birds, would be expected to increase for all life cycles that may occur in the area.

19.8.2 Assessments for Migratory Birds and Habitat Features

In July 2023, two wildlife surveys were completed within 100 m of the natural gas pipeline route and CO_2 pipeline routes (Pipeline Routes) and the power transmission line (Interconnection Option 1) (Figure 19.2). The first visit was completed between June 5 and June 9, 2023, to capture early breeders and the second visit was completed between July 2 and July 7, 2023, to capture mid- to late-season breeders.

Survey methods for breeding bird surveys followed the provincial *Sensitive Species Inventory Guidelines* for Boreal and Foothills Breeding Songbirds and Woodpeckers (ESRD 2013b). For the nocturnal bird and nocturnal amphibian surveys, autonomous recording units (ARUs) were deployed to record vocalizations of target species, including western toad (*Anaxyrus boreas*), common nighthawk (*Chordeiles minor)*, and yellow rail (*Coturnicops noveboracensis).*

The ARU units were affixed to trees during the breeding season for target species and programmed to record for 15 minutes every hour starting 30 minutes prior to sunset (approximately 2130 hrs) and ending at sunrise (approximately 0515 hrs). ARUs were placed adjacent to habitat suitable specifically for western toad and yellow rail at ARU02, ARU12, and ARU06, and adjacent to habitat suitable for common nighthawk at ARU01, ARU09, ARU03, ARU07 and ARU08 (Figure 19.2). Suitable habitat for all three species was identified adjacent to ARU04, and ARU05. Sound files will be analyzed in Fall 2023 for the presence of target species and incidental detection of other Species of Management Concern (SOMC). There were no incidental observations of western toad or tadpoles, common nighthawk, or yellow rail during the survey.

In addition to the ARU units, a total of forty breeding bird point count stations were surveyed twice for the Project (Figure 19.2). Seventy-two bird species (59 songbirds, 2 woodpeckers, 7 waterbirds, 1 upland game bird and 3 shorebirds), comprised of 1,020 individual bird observations, were recorded within the 100 m survey point-count radii (plots) during the two survey visits. Seven additional species comprised of 374 individuals were recorded incidentally outside of the 100 m plots.

A total of fourteen SOMC[2] (trumpeter swan, pied-billed grebe, sora, sandhill crane, great gray owl, great blue heron, pileated woodpecker, western wood-pewee, eastern kingbird, barn swallow, evening grosbeak, common yellowthroat, Canada warbler, and western tanager) were observed systematically during the surveys (i.e., within the 100 m survey point-count radii) and incidentally (i.e., outside of the 100 m plots) (Table 19.27).

A total of 72 species of migratory birds were observed either systematically or incidentally during breeding bird surveys in 2023, including those listed in Table 19.27.

Table 19-27 Migratory Birds Observed During Summer 2023 Breeding Bird Surveys

Common Name	Scientific Name	Alberta General Status 2020	COSEWIC	SARA Schedule and Status
Canada goose	*Branta canadensis*	Secure	-	- -
Mallard	*Anas platyrhynchos*	Secure	-	- -
Blue-winged teal	*Spatula discors*	Secure	-	- -
Ring-necked duck	*Aythya collaris*	Secure	-	- -
Bufflehead	*Bucephala albeola*	Secure	-	- -

[2] SOMC for the Project are defined as those listed: under Schedule 1 of the *Species at Risk Act* (SARA) as endangered, threatened, or special concern (GOC 2023), under the Alberta *Wildlife Act* as endangered or threatened by the Alberta Endangered Species Conservation Committee (ESCC) and its Scientific Subcommittee (SSC) (GOA 2023), by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened, or special concern (GOC 2023), as special concern by the ESCC and its SSC (GOA 2023b), or as at risk, may be at risk, or sensitive by the General Status of Alberta Wild Species (AEP 2022).

Table 19-27 Migratory Birds Observed During Summer 2023 Breeding Bird Surveys

Common Name	Scientific Name	Alberta General Status 2020	COSEWIC	SARA Schedule and Status
Common goldeneye	*Bucephala clangula*	Secure	-	- -
Common loon	*Gavia immer*	Secure	Not at Risk	No schedule No Status
Pied-billed grebe	*Podilymbus podiceps*	Sensitive	-	- -
Great blue heron	*Ardea herodias*	Sensitive	-	- -
Sora	*Porzana carolina*	Sensitive	-	- -
Sandhill crane	*Antigone canadensis*	Sensitive	-	- -
Spotted sandpiper	*Actitis macularius*	Secure	-	- -
Solitary sandpiper	*Tringa solitaria*	Secure	-	- -
Wilson's snipe	*Gallinago delicata*	Secure	-	- -
Mourning dove	*Zenaida macroura*	Secure	-	- -
Yellow-bellied sapsucker	*Sphyrapicus varius*	Secure	-	- -
Downy woodpecker	*Dryobates pubescens*	Secure	-	- -
Hairy woodpecker	*Dryobates villosus*	Secure	-	- -
Northern flicker	*Colaptes auratus*	Secure	-	- -
Western wood-pewee	*Contopus sordidulus*	May Be at Risk	-	- -
Alder flycatcher	*Empidonax alnorum*	Secure	-	- -
Least flycatcher	*Empidonax minimus*	Secure	-	- -
Eastern kingbird	*Tyrannus tyrannus*	Sensitive	-	- -
Blue-headed vireo	*Vireo solitarius*	Secure	-	- -
Warbling vireo	*Vireo gilvus*	Secure	-	- -
Philadelphia vireo	*Vireo philadelphicus*	Secure	-	- -
Red-eyed vireo	*Vireo olivaceus*	Secure	-	- -
Tree swallow	*Tachycineta bicolor*	Secure	-	- -
Cliff swallow	*Petrochelidon pyrrhonota*	Secure	-	- -
Barn swallow	*Hirundo rustica*	May Be at Risk	Special Concern	Schedule 1 Threatened
Black-capped chickadee	*Poecile atricapillus*	Secure	-	- -
Boreal chickadee	*Poecile hudsonicus*	Secure	-	- -
Red-breasted nuthatch	*Sitta canadensis*	Secure	-	- -
House wren	*Troglodytes aedon*	Secure	-	- -
Winter wren	*Troglodytes hiemalis*	Secure	-	- -
Golden-crowned kinglet	*Regulus satrapa*	Secure	-	- -
Ruby-crowned kinglet	*Regulus calendula*	Secure	-	- -
Swainson's thrush	*Catharus ustulatus*	Secure	-	- -
Hermit thrush	*Catharus guttatus*	Secure	-	- -
American robin	*Turdus migratorius*	Secure	-	- -

Table 19-27 Migratory Birds Observed During Summer 2023 Breeding Bird Surveys

Common Name	Scientific Name	Alberta General Status 2020	COSEWIC	SARA Schedule and Status
Varied thrush	*Ixoreus naevius*	Secure	-	- -
Cedar waxwing	*Bombycilla cedrorum*	Secure	-	- -
Ovenbird	*Seiurus aurocapilla*	Secure	-	- -
Northern waterthrush	*Parkesia noveboracensis*	Secure	-	- -
Black-and-white warbler	*Mniotilta varia*	Secure	-	- -
Tennessee warbler	*Leiothlypis peregrina*	Secure	-	- -
Orange-crowned warbler	*Leiothlypis celata*	Secure	-	- -
Nashville warbler	*Leiothlypis ruficapilla*	Secure	-	- -
Connecticut warbler	*Oporornis agilis*	Secure	-	- -
Mourning warbler	*Geothlypis philadelphia*	Secure	-	- -
Common yellowthroat	*Geothlypis trichas*	Sensitive	-	- -
American redstart	*Setophaga ruticilla*	Secure	-	- -
Magnolia warbler	*Setophaga magnolia*	Secure	-	- -
Yellow warbler	*Setophaga petechia*	Secure	-	- -
Palm warbler	*Setophaga palmarum*	Secure	-	- -
Yellow-rumped warbler	*Setophaga coronata*	Secure	-	- -
Canada warbler	*Cardellina canadensis*	May Be at Risk	Special Concern	Schedule 1 Threatened
Wilson's warbler	*Cardellina pusilla*	Secure	-	- -
Chipping sparrow	*Spizella passerina*	Secure	-	- -
Clay-colored sparrow	*Spizella pallida*	Secure	-	- -
Nelson's sparrow	*Ammospiza nelsoni*	Secure	Not at Risk	No schedule No Status
Song sparrow	*Melospiza melodia*	Secure	-	- -
Lincoln's sparrow	*Melospiza lincolnii*	Secure	-	- -
Swamp sparrow	*Melospiza georgiana*	Secure	-	- -
White-throated sparrow	*Zonotrichia albicollis*	Secure	-	- -
Dark-eyed junco	*Junco hyemalis*	Secure	-	- -
Western tanager	*Piranga ludoviciana*	Sensitive	-	- -
Rose-breasted grosbeak	*Pheucticus ludovicianus*	Secure	-	- -
White-winged crossbill	*Loxia leucoptera*	Secure	-	- -
Pine siskin	*Spinus pinus*	Secure	-	- -
American goldfinch	*Spinus tristis*	Secure	-	- -
Evening grosbeak	*Coccothraustes vespertinus*	Secure	Special Concern	Schedule 1 Special Concern

Table 19-28 Species at Risk and SOMC Recorded during the Breeding Bird Survey

Common name	Scientific name	Number observed systematically*	Number observed incidentally**	COSEWIC status[1]	SARA status (Schedule 1)[1]	AEP general status[2]	Migratory Bird***
Pied-billed grebe	*Podilymbus podiceps*	-	1	-	-	Sensitive	Migratory Bird
Sora	*Porzana carolina*	3	1			Sensitive	Migratory Bird
Sandhill crane	*Antigone canadensis*	-	13	-	-	Sensitive	Migratory Bird
Great blue heron	*Ardea herodias*	1	-	-	-	Sensitive	Migratory Bird
Great gray owl	*Strix nebulosi*	-	1	-	-	Sensitive	-
Pileated woodpecker	*Dryocopus pileatus*	-	1	-	-	Sensitive	Migratory Bird
Western wood-pewee	*Contopus sordidulus*	13	7	-	-	Sensitive	Migratory Bird
Eastern kingbird	*Tyrannus tyrannus*	1	-	-	-	Sensitive	Migratory Bird
Barn swallow	*Hirundo rustica*	1	-	Special Concern	Threatened	Sensitive	Migratory Bird
Evening grosbeak	*Coccothraustes vespertinus*	7	-	Special Concern	Special Concern	Sensitive	Migratory Bird
Common yellowthroat	*Geothlypis trichas*	41	13	-	-	Sensitive	Migratory Bird
Canada warbler	*Cardellina canadensis*	2	-	Special Concern	Threatened	Sensitive	Migratory Bird
Western tanager	*Piranga ludoviciana*	7	-	-	-	Sensitive	Migratory Bird
Trumpeter swan	*Cygnus buccinator*	-	2	-	-	Sensitive	Migratory Bird

NOTES:

* Wildlife species observed within the 100 m survey point-count radii (e.g., 50 m on either side of the Natural Gas Pipeline Route)

** Wildlife species observed outside of the 100 m survey point-count radii

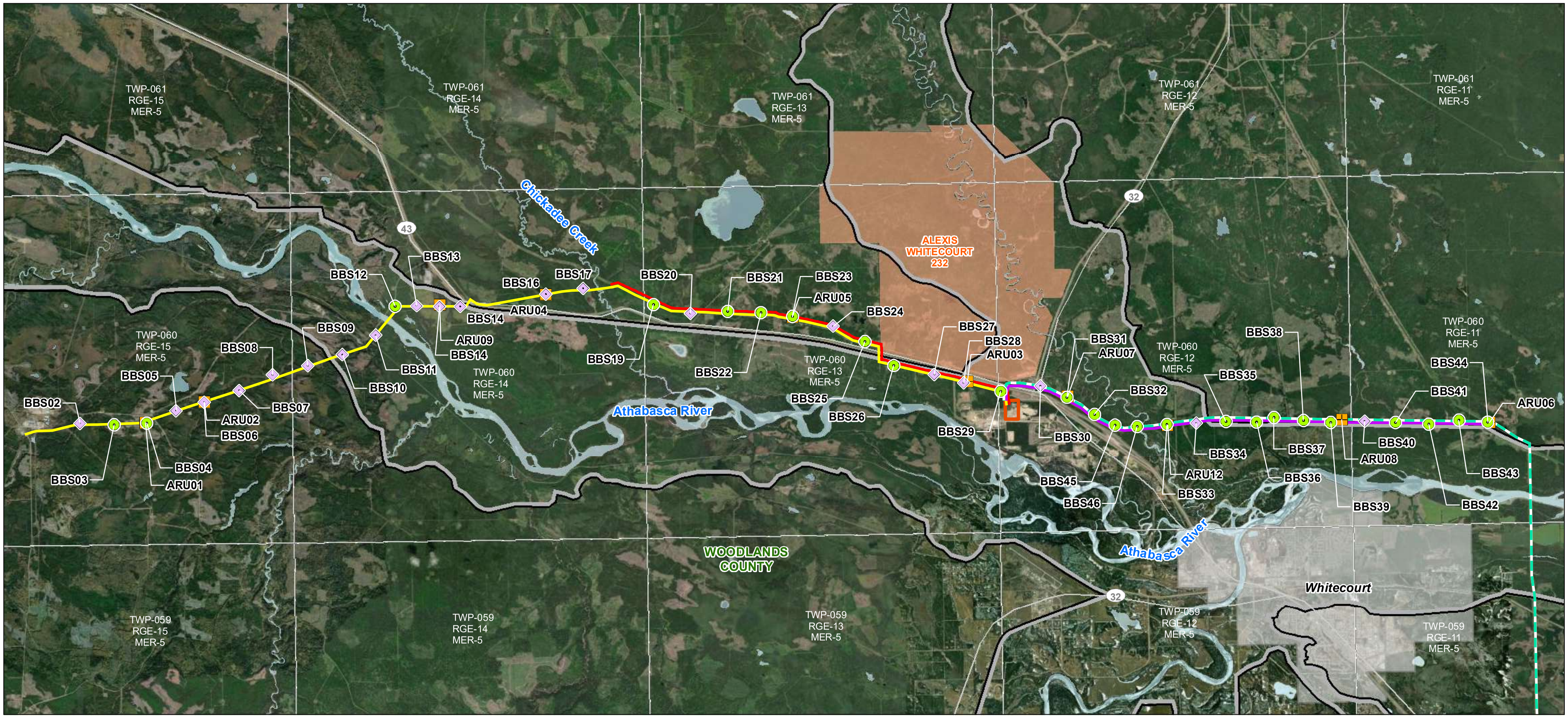
*** Species is a Migratory Bird under the MBCA

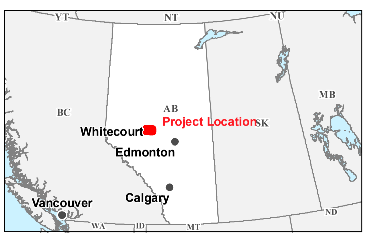
"-"= not protected as a Migratory Bird under the MBCA or not applicable.

SOURCES:

[1] GOC 2023

[2] AEP 2022





- Breeding Bird Survey Station
- Species of Management Concern Observation
- Autonomous Recording Unit Location
- Interconnection Option 1
- Interconnection Option 2
- Preferred CO_2 Pipeline Route
- Preferred Natural Gas Pipeline Route
- Proposed Power Generation Facility
- Major Road
- First Nation Reserve
- Key Wildlife and Biodiversity Zone
- Township
- Urban Area
- Waterbody

Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Government of Alberta and Canada, Stantec and General Electric
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Stantec

Project Location
Whitecourt, Alberta

Prepared by SL on 2023-08-16
TR by DA on 2023-08-16
IR Review by JR on 2023-08-16

Client/Project
110220760-020 REVA
Client: Moraine Initiatives Ltd.
Project: Moraine Power Generation Project
Detailed Project Description

Figure No.
19.2

Title
2023 Wildlife Survey Stations and Observations

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19.8.3 Mitigation

Construction

Mitigation measures that may be implemented during construction to address potential effects on wildlife and wildlife habitat (including for species at risk and migratory birds) are listed in Table 19-29 and are typical to facility, pipeline, and transmission line construction projects. As Project planning progresses, further mitigation measures, including site-specific mitigation measures for sensitive resources, will be developed.

Table 19-29 Potential Construction Phase Mitigation Measures for Wildlife and Wildlife Habitat

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change to habitat	Direct loss or alteration of habitat from vegetation removal and ground disturbance Indirect loss or alteration of habitat effectiveness through sensory disturbance	• Activities will be restricted to the Project footprint to minimize vegetation loss. • Do not allow clearing or grubbing beyond the marked construction temporary workspace boundaries. • Prior to the start of clearing, clearly mark all sensitive resources and associated buffer areas according to Project-specific documentation. • Minimize the extent of temporary workspace within sensitive environmental features and areas (e.g., wetlands, riparian areas, trumpeter swan waterbody buffers). • Clearing of vegetation will occur outside of the restricted activity period for migratory birds. As pileated woodpecker and great blue heron have nests that are protected year-round and have the potential to occur within the Project area, sweeps will be completed to identify nests that must be protected, and setbacks will be implemented for construction. Prior to beginning Project construction activities within a KWBZ, consult with AEPA biologists to determine if site-specific plans or mitigation measures are required. • Prior to beginning Project construction activities within 800 m of a trumpeter swan waterbody, consult with AEPA biologists to determine if site-specific plans or mitigation measures are required. • Dewatering of construction areas, if necessary, will be directed to areas that avoid effects to wetlands • Adhere to applicable measures outlined in the Master Schedule of Standards and Conditions (GOA 2021). • Ensure that noise abatement equipment on vehicles and machinery is maintained in good working order. • Minimize vehicle and equipment idling. • During construction, the use of site flood lighting during the migration periods (i.e., April to May and late August through October) will be limited.

Table 19-29 Potential Construction Phase Mitigation Measures for Wildlife and Wildlife Habitat

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in movement	Alteration or impediment of wildlife movement due to physical barriers, sensory disturbance, or vegetation removal (i.e., gaps in forested habitat) associated with pipeline or compressor station construction or operation	• Establish gaps in windrows (e.g., soil, snow) and string pipe where features such as wildlife trails and drainages cross the ROW to allow wildlife to cross the construction footprint. Locations where wildlife gaps should be established will be determined in the field by the Environmental Inspector. Gap associated with multiple barriers should align. • Limit the amount of time that a trench is left open, or a barrier is left in place.
Change in mortality risk	Ground disturbance and vegetation clearing resulting in physical destruction of key habitat features (e.g., nests, dens, hibernacula) Vehicle and equipment movement and ground disturbance resulting in accidental mortality of small, less mobile species or individuals (e.g., small rodents, amphibians, reptiles, juvenile birds Trapped wildlife (i.e., excavation areas) Vehicle-wildlife collisions Wildlife-human conflict	• Do not harass or feed wildlife. Personnel are prohibited from hunting, fishing, possessing, or feeding wildlife on the construction footprint. • Do not permit personnel to have dogs or other pets on the work area. • Clearing of vegetation will occur outside of the restricted activity period for migratory birds. As pileated woodpecker and great blue heron have nests that are protected year-round and have the potential to occur within the Project area, sweeps will be completed to identify nests that must be protected, and setbacks will be implemented for construction. • If construction activities or clearing are planned during the migratory bird nesting period or raptor/owl nesting period, complete nest searches no more than 7 days prior to undertaking the activity. If an active nest is found, implement setback buffers according to the direction of a qualified wildlife professional. • If construction activities or clearing are planned during the active period for amphibians, install exclusion fencing near key amphibian habitat (e.g., breeding wetland). Amphibian search, salvage and relocation may be required and should be completed during the direction of a qualified wildlife professional. • If construction activities or clearing are planned during the active bat period, complete bat roost surveys in patches of suitable trees that will be cleared. If an active roost is found, implement setback buffers according to the direction of a qualified wildlife professional. • If construction activities or clearing are planned during the bear hibernating period, complete bear den surveys in suitable habitat near the Project footprint. If an active den is found, implement setback buffers according to 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 Environmental Inspector. Establish construction traffic speed limits on access roads to reduce the risk of collisions with wildlife.

Table 19-29 Potential Construction Phase Mitigation Measures for Wildlife and Wildlife Habitat

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change in mortality risk (cont'd)		• Where practical, use multi-person vehicles to transport crews to and from the construction site. • Collect waste generated from the work site (e.g., construction garbage, food, industrial waste) on a regular basis and dispose at an approved facility to avoid attracting wildlife. Appropriate waste containers will be available on site. • In the event of a discovery of a wildlife species at risk or species of management concern, or key habitat feature during construction, report sightings to the Environmental Inspector. Appropriate mitigation measures will be established in consultation with the Environmental Inspector, qualified wildlife professional and the appropriate regulatory authorities, if warranted. • An assessment of construction traffic will be completed prior to the start of construction and will inform any additional mitigation measures necessary.

Following implementation of mitigation measures, Project construction will have negligible residual effects on wildlife and wildlife habitat and wildlife mortality, including species at risk and migratory birds as there is little habitat to support wildlife in the PGF, and the pipelines and transmission line will be constructed adjacent to existing disturbance. Residual effects are anticipated to be short-term and irregular in frequency and reversible, except in relation to mortality, which is irreversible.

Operation

Mitigation measures that may be implemented during construction to address potential effects on wildlife and wildlife habitat (including for species at risk and migratory birds) are listed in Table 19.29 and are typical to facility, pipeline, and transmission line operations.

Table 19-30 Potential Operations Phase Mitigation Measures for Wildlife and Wildlife Habitat

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change to habitat	Indirect loss or alteration of habitat effectiveness through sensory disturbance during operations	• Ensure that noise abatement equipment on the facility is maintained in good working order. • Ensure that noise abatement equipment on vehicles and machinery is maintained in good working order. • Minimize vehicle and equipment idling. • Facility lighting will be as efficient as possible, while providing enough light to make the site safe and secure.

Table 19-30 Potential Operations Phase Mitigation Measures for Wildlife and Wildlife Habitat

Potential Effects and Pathways		
Potential Effect	**Effect Pathways**	**Mitigation Measures**
Change to habitat (con't)	Indirect loss or alteration of habitat effectiveness through sensory disturbance during routine maintenance	• Perimeter lighting will be directed inward towards the PGF to minimize light trespass to the environment and surrounding areas as much as possible.
	New habitat creation (e.g., structures available to raptors and corvids as perches or for nesting)	• Install bird nest and perch deterrents to protect birds and infrastructure according to industry standards.
Change in mortality risk	Bird collisions with overhead lines (particularly less maneuverable species)	• Install bird markers on overhead lines, particularly in high risk areas, to increase visibility of the conductor and/or overhead shield wires according to industry standards.

Following implementation of mitigation measures, Project operation will have negligible residual effects on wildlife and wildlife habitat, including species at risk and migratory birds, that are low in magnitude, long-term and reversible. As the PGF will be void of vegetation, wildlife use is anticipated to be low and temporary.

Decommissioning/Abandonment

Mitigation measures similar to those implemented during construction would be employed during decommissioning or abandonment activities to reduce potential effects on wildlife and wildlife habitat. Vegetation will be re-established in areas where it was removed and once re-established it will be available for wildlife use.

20 Potential Effects on Extra-Provincial and Federal Lands

The Project is not expected to have effects on lands outside of Alberta or Canada. The Project is not located on federal lands, although there are Indigenous reserve lands in the vicinity of the Project (Table 4.1).

Given the distances to most reserves, changes to federal lands by the Project are not anticipated. The Project is proximal to the Alexis Whitecourt No. 232 and Alexander No. 134A reserve land and care will be taken to minimize potential changes to federal lands. Given the analysis described in Section 19, the Project is not anticipated to adversely affect Alexis Nakota Sioux Nation’s reserve land. Given the size of the Project and the localization of effects on air quality, acoustic (noise), soil, vegetation, wildlife, groundwater, surface water and fish and fish habitat, the Project is not anticipated to have any adverse environmental effects outside of Alberta.

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

As described above, the proposed PGF site is situated on Crown land and is currently under lease for aggregate resource extraction. The area where the CCGT and ICCF will be constructed has been fully mined for aggregate and is almost no vegetation cover. The entire site has been disturbed so any area with vegetation is comprised of regrowth. As the area has been used for commercial operations, it has not been available for public or Indigenous use.

Currently there are no sites or structures of historical, archaeological, paleontological, or historical significance on record in the proposed PGF site. The PGF site lands are not included in the Alberta *Listing of Historic Resources* (Fall 2022 version). The linear components of the Project are anticipated to be within or adjacent to existing infrastructure (roadways, transmission lines, pipelines) for much of their routing. The routes do traverse areas of high historical resource potential, based both on landscape attributes (such as watercourse crossings) and/or inclusion in the *Listing*.

Electrical transmission Interconnection Option 1 crosses the Sakwatamau River valley, as well as other tributary creeks, with a high potential for archaeological sites. It also traverses lands included in the Alberta *Listing* with HRVs of 4a and 5a, indicating a known and significant archaeological site (precontact artifact/lithic scatter) in proximity and associated areas of high archaeological site potential. An additional precontact lithic artifact scatter site is within 30 m of the proposed alignment and may be impacted; this site lies within a developed right-of-way, however, and has an HRV of 0, indicating little to no remaining archaeological value based on the AC regulatory system. This Option also traverses lands included in the *Listing* with HRVs of 4c. This may trigger engagement with Indigenous nations relative to the *Historical Resources Act* (HRA). Portions of these lands may be related to nearby HRV of 4h lands which include an area of protective notification for “Native Burial Grounds”. This area is within 350 m of the proposed alignment.

Electrical transmission Interconnection Option 2 extends south and crosses the Athabasca River valley – an area of high archaeological and palaeontological site potential. The Athabasca River crossing area has HRVs of 5a (high potential for archaeological sites) with HRVs of 4a (known and significant archaeological site within LSD) and 5a further south. The HRV 4a site, a precontact campsite, is not in conflict with the proposed alignment. The Athabasca River crossing area has HRVs of 4p (known and significant palaeontological site) and 5p (high potential for palaeontological resources).

The proposed alignment of the CO_2 pipeline northwest section traverses lands with HRV of 5a (high potential for archaeological sites) but does not intersect with known or recorded sites. The alignment also traverses lands with HRV of 5p, along the Chickadee Creek valley.

The remaining portion of the CO_2 pipeline and the paralleling portion of the natural gas pipeline do not cross lands with HRVs for archaeology or palaeontology, but do intersect with HRV 4c lands, with the potential to trigger Indigenous nation engagement under the *HRA*. The remaining portion of the natural gas pipeline (west of the intersection with the CO_2 pipeline) crosses the high potential Athabasca River valley and a series of tributary creeks. Lands with HRVs of 4a and 5a are crossed, with two significant precontact artifact scatter sites in proximity (within 70 m and 125 m). Lands with HRVs of 5p are again crossed in the Chickadee Creek valley area. Lands with HRVs of 4c extend to within 75 m of the proposed alignment but are not in apparent conflict.

As the Project footprint is further defined, a Historic Resources Application will be prepared and submitted to AC for review. The regulator will review the Project relative to anticipated impacts to historical resources and cultural aspects. Conditions may include engagement with Indigenous nations in order to acquire Project approval. Mitigation measures will be completed as directed by AC, including activities such as avoidance of impact through Project redesign, field-based impact assessments (archaeology and/or palaeontology), site-specific mitigation measures (e.g., controlled surface collection of cultural materials, archaeological excavation, documentation of historical structures activities). In addition, if an Historic Resources Impact Assessment (HRIA) is required and is possible that Traditional Land Use (TLU) sites are encountered, they will be reported to AC either as an archaeological site (e.g., a collapsed cabin structure, trails, etc.), historical structure site (e.g., cabin, house, barn/outbuildings > 40 years old), and/or other TLU type site (e.g., trap line, trap, etc.) through description in report. If these sites are culturally sensitive areas (e.g., offering, poss. burial, etc.), these would be discussed with MIL, AC, and identified Indigenous nations, prior to including in any report. AC may require mitigative measures during the construction phase such as monitoring for palaeontological resources. A chance find protocol will be developed to establish process in the case of encountering archaeological and/or palaeontological during Project construction.

Traditional land and resource use that currently is practiced by Indigenous nations in the vicinity of the Project include hunting, fishing, trapping, traditional plant uses and cultural transmission (e.g., spiritual growth). Many of the Indigenous nations identified the Project area as being used both historically and currently by their nations. None of the Indigenous nations have actively shared any site-specific information that overlaps the Project footprint.

It is MIL's intent to limit the effects from the Project on TLU to the extent possible. One of the key criteria in selecting the Project sites was to consider for the availability of hunting, fishing, trapping and traditional plant uses in the Project area. Adverse effects to current use of lands and resources for traditional purposes are not anticipated for the PGF site, as this area is already zoned for industrial use by Woodlands County and is an active aggregate extraction quarry. Access to the PGF site is restricted by way of the *Public Lands Act* disposition that is currently held by another company. In addition, there is limited vegetation cover, and potential habitat for wildlife and also traditional land uses.

One of the strategies for siting of the linear infrastructure has been to place it directly adjacent to existing ROWs where disturbance has already occurred, thereby limiting the landscape level fragmentation. While there may be overlap between the linear Project components and traditional uses, the effects are anticipated to be limited to construction and are expected to be temporary. Construction will occur over several months for the linear features, to three years for the PGF; limiting access to areas where construction activities are occurring will be necessary for the safety of the public, including Indigenous peoples. Communication will be ongoing with land users including those who may engage in traditional practices to identify areas of concern and overlap. Through ongoing engagement, MIL will continue to discuss the timing of construction activities with Indigenous nations who practice in the vicinity, while also adhering to environmental restricted activity periods as described in Section 19. Prior to construction, MIL will provide the opportunity for site visits, ceremony and harvesting of traditional plants within the Project area for nations.

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

The Project is within the traditional lands of 32 Indigenous nations, as described in Section 4.1. The Alexis Whitecourt (No. 232) reserve is the closest reserve to the Project, located approximately 1 km north of the PGF site on the north side of Highway 43. The natural gas pipeline, CO_2 pipeline, and power transmission line will be constructed outside of Indigenous reserve boundaries. Currently, based on the demographics in the region, there are no permanent residents on the Alexis Whitecourt (No. 232) reserve (Statistics Canada, Census 2021*)*. The nearby Eagle River Casino and Travel Plaza is a commercial operation with no permanent or seasonal residence, the Eagle River Tourism RV Park (RV Park) is located approximately 1.1 km northeast of the proposed Project boundary. Both of these potential receptors have been included for consideration in the Air Quality and Acoustic Environment effects assessments (see Sections 19.2 and 19.3, above).

The PGF site is proposed where current natural resource extraction is occurring, adjacent to the ANC facility. A key factor in the site selection for the Project was based on the site being a brownfield site; the environmental effects from the construction and operation of the PGF are expected to be not significant and localized and therefore adverse effects to Indigenous peoples are also expected to be minimal. Changes to the environment, including air quality, acoustic (noise), soil, vegetation, wildlife, groundwater, surface water and fish and fish habitat are expected to be localized to the Project components (see Section 19 for potential effects). Effects on the environment are expected to be limited to changes to air quality and noise at the PGF site; however, these changes are within the respective guidelines for air quality and noise within the site when mitigation measures have been applied (see Sections 19.1 and 19.2 for specific guidelines) and therefore, within guidelines for nearby receptors, including the traditional lands of Indigenous nations and their uses (e.g., hunting, fishing, plant harvesting). Based on the results of the Project air quality modeling and noise impact assessment, residual Project effects on Indigenous communities are anticipated to be low.

MIL has been actively engaging in with Indigenous nations, discussed in Section 4.1, that included identifying and participating in meaningful processes to promote economic prosperity for the Indigenous nations. Socio-economic effects are anticipated to be positive for Indigenous nations due to opportunities for employment during construction and operations of the PGF. Through initial meetings and ongoing engagement sessions with various Indigenous nations (see Section 4) key themes emerging from engagement included requests for more detailed Project information, potential Project effects and benefits, traditional land use studies, Indigenous procurement and equity opportunities, capacity funding, as well as ongoing meaningful engagement and consultation.

23 Greenhouse Gas Emissions Associated with the Project

During Project construction and operation, GHG emissions expressed as carbon dioxide equivalent (CO_2e) are associated with CO_2, methane (CH_4) and nitrous oxides (N_2O) emissions. The Project will be designed to achieve 95% CO_2 removal. The CO_2 emissions are based on manufacturer performance estimates, conservatively assuming power output (465 MW_{net}), 95% CO_2 capture and removal, and a 95% utilization factor (347 days of operation per year). Emission factors and methodologies from the Alberta Greenhouse Gas Quantification Methodologies (AQM) under Technology Innovation and Emissions Reduction Regulation (TIER) (AEP 2021a), AEPA Specific Gas Reporting Standard (SGRS) (AEPA 2023), Western Climate Initiative (WCI) Final Essential Requirements of Mandatory Reporting: Amended for Canadian Harmonization – Second Update (FERMR) (WCI 2011), and ECCC Canada's Greenhouse Gas Quantification Requirements (ECCC 2023a). The Global Warming Potential (GWP) of CH_4 and N_2O are 28 and 265 based upon the IPCC Fifth Assessment Report (AR5). Project operation GHG emissions are summarized in Table 23.1. Net Project GHG emissions are calculated consistent with equation 1 of the *Strategic Assessment of Climate Change*.

Table 23-1 Estimated Maximum Project GHG Emissions Associated with Operation

Pollutant	GHG Emissions (tonne/year)	GHG Emission Intensity (kg/MWh)
CO_2	79,881 (79,881)	20.6 (20.6)
CH_4	118 (3,305)	0.0305 (0.854)
N_2O	42.2 (11,173)	0.0109 (2.89)
CO_2e	94,359	24.4
NOTES: CO_2e calculated based upon AR5 GWP as $CO_2e = CO_2 + 28 \times CH_4 + 265 \times N_2O$. Values in brackets express individual component emissions in form of CO_2e.		

Construction and decommissioning GHG emissions will be limited to the construction and decommissioning phases of the Project, and are expected to be less than Project operations, and occur for a limited duration. Construction and decommissioning phases of the Project are expected to generate 25,350 tonne and 8,450 tonne of CO_2e, respectively. Construction and decommissioning GHG emissions are small compared to Project operations.

Canada's GHG emissions were 670 megatonnes (Mt) CO_2e in 2021 (the most recent year for which data are available for this report) based upon Canada's National Inventory Report 1990–2021: Greenhouse Gas Sources and Sinks in Canada (ECCC 2023b). This is an increase of 12 Mt (1.8%) from 2020 emissions (659 Mt). Canada's 2020 emissions were affected by substantial reductions in transportation and stational combustion emissions associated with the COVID-19 pandemic. Alberta's GHG emissions were 256 Mt CO_2e in 2021 and 254 Mt CO_2e in 2020. Maximum estimated Project Operations GHG emissions are 0.014% and 0.037% of Canada's and Alberta's total annual GHG emission in 2021.

The Project is estimated to have a net GHG emission intensity of 24.4 kg CO_2e/MWh of electricity which is approximately 5% of the average GHG emission generation intensity of 510 kg CO_2e/MWh for the Alberta electrical grid in 2021 (ECCC 2023b). The average emission intensity of the Alberta grid has declined in recent years (850 kg CO_2e/MWh in 2015) due to retirement of a number of coal generating units and increasing use of natural gas rather than coal at a number of generating stations and increasing deployment of wind and solar generation.

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

The *Strategic Assessment of Climate Change* requires projects with a lifetime beyond 2050 to detail how the Project will achieve net-zero emissions by 2050.

MIL has several CO_2 emissions offsetting options available to it to ensure net-zero emissions performance by 2050. As technical and commercial options will likely evolve considerably before 2050, the list below represents a sample of options that may be available to MIL prior to 2050:

- technological improvements
- incorporating renewable natural gas and biomass as a fuel source
- Investment in physical offset projects

24 Waste and Emissions Generated by the Project

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

24.1 Air

Air emissions generated during construction of the PGF will result from several sources and activities (see Air Quality Effects of the Project, Section 19.2 above). Particulate matter is the term used to refer to solid particles and liquid droplets found in the air. Particulate matter is reported according to the diameter of the particle size; PM_{10} refers to coarse dust particles 2.5 to 10 microns in diameter and typically includes crushing and grinding operations and dust from vehicles on roads. $PM_{2.5}$ refers to fine particles 2.5 microns or less in diameter and can only be seen with an electron microscope. Fine particles are produced from all types of combustion and some industrial processes.

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

Construction equipment will also emit greenhouse gases which is presented in Section 23, above.

24.2 Noise

Noise emissions during construction would be primarily related to the use of heavy equipment and trucks to clear vegetation, prepare the ground surface and install equipment. During operations, noise will be generated from rotating equipment including inlet exhaust, ventilation openings, coolers, compressors, and transformers. Other ancillary equipment will also generate noise. For details on noise emissions, see Acoustic Environment Effects of the Project, Section 19.3 above.

The noise emissions produced during operations of the CCGT gas turbine will be substantially curtailed first by the turbine noise enclosure and then subsequently by the turbine hall building. The facility will be designed to comply with applicable regulatory noise limits, including AUC Rule 012: Noise Control's Permissible Sound Levels (PSLs) and AER's Directive 038: Noise Control. Reasonably foreseeable mitigation measures include exhaust silencers, air inlet silencers, enclosing equipment in buildings, and procuring equipment with noise ratings that will allow the Project to meet Rule 012 requirements.

In the event of a noise complaint, MIL will follow the complaint resolution process outlined in Rule 012 and through the process that will be developed for the operational phase of the Project for comments, concerns and complaints. This process includes conducting a noise complaint investigation in a timely manner and may include conducting a comprehensive sound survey during representative conditions.

24.3 Liquid Discharges

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

Optimization of process water generation and disposal will continue through Project development and design. Process water for the PGF is estimated to be approximately 2,878 m^3/d (528 US gpm). However (as further discussed in Section 9.2.1), this estimate does not consider optimization of water streams produced in the ICCF Quencher sub-component. Quencher water production can be significant, and some of this quantity of water can be used to offset overall water needs when the PGF is fully operational. This will result in a reduction of total process water volumes to be discharged. When in full operation, final process water disposal volumes for the PGF are expected to be reduced below 2,878 m^3/d (528 US gpm) through design coordination with the ICCF OEM (e.g., inclusion of a cooling water loop). The PGF's process water discharges will be temporarily stored on-site in a storage tank and removed by a third-party hauler for disposal at an approved off-site facility or through the use of new or existing disposal wells. Further evaluation of the hydrogeological conditions of the area is needed to assess the location, number and density of the disposal wells necessary to achieve a sustainable injection and determined in the detailed design process.

Surface water runoff will be collected over the PGF site and contained in an appropriately sized pond to meet the 1 in 100-year 24-hr storm requirement, as discussed in Section 19.7 above and Appendix E. The pond will be constructed with a liner to prevent leaching of collected water to groundwater.

The domestic sewage waste from the PGF will be collected in on-site tanks and will be serviced on a regular basis. Tanks will have secondary containment, in the event of a leak or spill.

24.4 Other Waste Types

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

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

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

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Appendices

Appendix A Photos

Client:	**Moraine Initiatives Limited**	**Project:**	**Power Generation Project**
Site Name:	**Site**	**Site Location:**	**Woodlands County, Alberta**

Photograph ID: 1

Photo Location:
North-Central Portion of the Site

Direction:
South

Survey Date:
08-Jul-22

Comments:
General view of the central portion of the site.

Photograph ID: 2

Photo Location:
Southwest Corner of the Site

Direction:
Northeast

Survey Date:
08-Jul-22

Comments:
Looking northeast across the southwest portion of the site.

Client:	Moraine Initiatives Limited	Project:	Power Generation Project
Site Name:	Site	Site Location:	Woodlands County, Alberta

Photograph ID: 3

Photo Location:
Southwest Corner of the Site

Direction:
East

Survey Date:
08-Jul-22

Comments:
Looking east along the south boundary of the site.

Photograph ID: 4

Photo Location:
Northwest Corner of the Site

Direction:
West

Survey Date:
08-Jul-22

Comments:
Vegetated area located within the northwest portion of the site.

Stantec **Photographic Log**

Client:	**Moraine Initiatives Limited**	**Project:**	**Power Generation Project**
Site Name:	**Site**	**Site Location:**	**Woodlands County, Alberta**

Photograph ID: 5

Photo Location:
North Boundary of the Site

Direction:
West

Survey Date:
08-Jul-22

Comments:
The north boundary of the site.

Photograph ID: 6

Photo Location:
Northeast Corner of the Site

Direction:
Southeast

Survey Date:
08-Jul-22

Comments:
View of the northeast portion of the site.

Appendix B Regulatory Designation

Impact Assessment Agency of Canada Agence d'évaluation d'impact du Canada

Prairie and Northern Region Région des Prairies et du Nord
9700 Japer Av, Suite 1145 9700 Japer Av, Suite 1145
Edmonton AB T5J 4C3 Edmonton AB T5J 4C3

August 30th, 2022 **Sent by email**

Roy Belden
Vice President
Moraine Initiatives Limited c/o GE Energy Financial Services
901 Main Avenue
Norwalk, CT 06851, USA
roy.belden@ge.com

Dear Roy Belden:

Subject: Applicability of the *Impact Assessment Act* on the proposed Moraine Initiatives Power Plant Project proposed by Moraine Initiatives Limited c/o GE Energy Financial Services (the proponent)

The *Impact Assessment Act* (IAA) describes the federal process for assessing the impacts of certain major projects. The *Physical Activities Regulations* (the Regulations) under the IAA describe those types of projects that would be subject to the requirements of the IAA. Proponents of projects described in the Regulations are required to submit an initial project description to the Impact Assessment Agency of Canada (IAAC) in order to determine whether an impact assessment is required. Further information on the IAA and associated regulations can be found at https://www.canada.ca/en/impact-assessment-agency.html.

Based on available information, IAAC has determined that the Project as proposed is described in the Regulations and therefore subject to the requirements of the IAA. As a result, the proponent is required to submit an initial project description to IAAC to commence the planning phase of the IAA.

The Project meets the description and applicable threshold of section 30 of the Regulations: *The construction, operation, decommissioning and abandonment of a new fossil fuel-fired power generating facility with a production capacity of 200 MW or more.*

The *Information and Management of Time Limits Regulations* describes the requirements of the initial project description to be submitted, and is available on the IAAC website.

/2

Note that in accordance with subsection 7(1) of the IAA proponents of a designated project are prohibited from carrying out any act related to the project that may cause one of the effects listed therein. Under subsection 7(3) of the IAA, a proponent may carry out any act related to the Project that may cause effects within areas of federal jurisdiction if:

- IAAC determines that an impact assessment is not required;
- the Minister of Environment and Climate Change has issued a Decision Statement allowing the project to proceed and the proponent is complying with associated conditions; or
- IAAC allows the specific activity that may cause these effects to be carried out if the activity is required to gather information for IAAC or the impact assessment of a Project.

For any questions related to the above, including discussions on the process for preparing and submitting an initial project description, please contact Nicolas Gosselin by phone 343-543-0326 or by email at nicolas.gosselin@iaac-aeic.gc.ca@canada.ca

Sincerely,

Nicolas Gosselin

Project Manager, Prairie and Northern Region

Impact Assessment Agency of Canada / Government of Canada

Attachment – Useful Legislation, Regulation, and Guidance Documents

For more information on the *Impact Assessment Act*, please refer to the following links:

Legislation and Regulations:
https://www.canada.ca/en/impact-assessment-agency/corporate/acts-regulations/legislation-regulations.html

Impact Assessment Process Overview:
https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/impact-assessment-process-overview.html

Practitioner's Guide to Federal Impact Assessments under the *Impact Assessment Act*:
https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act.html

Compendium of Policies and Guidance Documents:
https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance.html

Government of Canada News Release dated August 8, 2019:
https://www.canada.ca/en/impact-assessment-agency/news/2019/08/better-rules-for-impact-assessments-come-into-effect-this-month.html

Appendix C Indigenous Correspondence

MORAINE INITIATIVES LIMITED
c/o General Electric Canada
100-1919 Minnesota Court
Mississauga, ON L5N 0C9

June 29, 2022

To: Chief and Councilors
From: Ankur Mathur, Moraine Initiatives Limited

Hello Donald Rain,

My name is Ankur Mathur, and I am the head of the Moraine Initiatives Limited ("Moraine") development team. Moraine is a subsidiary of General Electric Company which operates in more than 160 countries across the globe. Moraine is considering developing a greenfield natural gas-fired power plant with integrated carbon capture capabilities (the "Project") in the vicinity of Whitecourt, Alberta, which I understand is in your Nation's traditional territory.

I would like to meet with you, learn about your Nation, hear your perspectives on energy projects, and explore how you may be interested in participating in the Project. Until we are able to meet, I'd like to share some project information so you can understand our interests in your traditional territory.

The Project

The Project will use sweet pipeline natural gas as fuel. It will generate about 465 megawatts (MW) of electricity for delivery to the Alberta power grid, while capturing and sequestering in deep underground geological formations about 4,000 tonnes/day of carbon dioxide (CO_2).

Several sites in the Whitecourt vicinity are currently being evaluated for the Project facilities, which would be developed on one main site of about 40 acres (16 hectares) in size. Further, Moraine is considering a range of alternatives for deep geological sequestration of its captured CO_2 emissions, including regional CO_2 sequestration hubs that may be developed within a reasonable distance to the Project site, pursuant to the Government of Alberta's competitive pore space allocation process.

The Project scope will also include the development of new interconnection infrastructure such as a sweet natural gas pipeline connection to a natural gas system in the Windfall, Alberta area, a CO_2 pipeline to connect to a CO_2 sequestration hub or facility, and a high-voltage electrical transmission connection to existing transmission lines in the Project site vicinity.

Subject to receipt of regulatory and other approvals, construction of the Project could start in early 2024, with the Project planned to enter commercial service in the mid-2027 time frame.

Power Plant Emission Control & Benefits

The Project will capture and geologically sequester 90-95% of the CO_2 contained in the power plant exhaust gas, making the Project's greenhouse gas emissions, measured on a tonnes of CO_2 per MWh basis, among the lowest for gas-fired power generators around the world.

The Project will be a highly efficient, low-carbon intensity power generation facility that is expected to operate in a "baseload" manner, i.e., continuous operation at or near full output. It will strongly contribute to Canada's greenhouse gas (GHG) emission reduction targets while supporting the required power grid reliability and longer-term electrification trends across Alberta.

If you would like to meet or schedule a call to discuss the Project, please contact Moraine's local consultant on the Project, Zoe Rezac of Stantec at zoe.rezac@stantec.com or 780-917-8188.

Sincerely,

<Original signed by>

Ankur Mathur, Vice President
Moraine Initiatives Limited

cc: Zoe Rezac, Stantec
Roy Belden, Moraine Initiatives Limited
Bridget Dougherty, Moraine Initiatives Limited

MORAINE INITIATIVES LIMITED
c/o General Electric Canada
100-1919 Minnesota Court
Mississauga, ON L5N 0C9

November 1, 2022

Hello,

My name is Ankur Mathur, and I am the head of the Moraine Initiatives Limited ("Moraine") development team. Moraine is a subsidiary of General Electric Company which operates in more than 160 countries across the globe. Moraine is considering developing a greenfield natural gas-fired power plant with integrated carbon capture capabilities (the "Project") in the vicinity of Whitecourt, Alberta, which may be in your Nation's traditional territory.

I am interested in learning about your Nation, hearing your perspectives on energy projects, and exploring how your Nation may be affected by the Project. I'd like to share some project information to initiate a conversation.

The Project

The Project will use sweet pipeline natural gas as fuel. It will generate about 465 megawatts (MW) of electricity for delivery to the Alberta power grid, while capturing and sequestering in deep underground geological formations about 4,000 tonnes/day of carbon dioxide (CO_2).

Several sites in the Whitecourt vicinity are currently being evaluated for the Project facilities, which would be developed on one main site of about 40 acres (16 hectares) in size. Further, Moraine is considering a range of alternatives for deep geological sequestration of its captured CO_2 emissions, including regional CO_2 sequestration hubs that may be developed within a reasonable distance to the Project site, pursuant to the Government of Alberta's competitive pore space allocation process.

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If you would like to meet or schedule a call to discuss the Project, please contact Moraine's local consultant on the Project, Zoe Rezac of Stantec at zoe.rezac@stantec.com or 780-917-8188.

Sincerely,

<Original signed by>

Ankur Mathur, Vice President
Moraine Initiatives Limited

cc: Zoe Rezac, Stantec
Roy Belden, Moraine Initiatives Limited
Bridget Dougherty, Moraine Initiatives Limited

From: Fedrau,Chelsea (IAAC/AEIC)
To: Howell, Jim; Gosselin,Nicolas (IAAC/AEIC)
Cc: Belden, Roy S (GE Corporate); Wilneff, Heather; Perret, Michele; Rezac, Zoë
Subject: RE: Preliminary list of Indigenous groups
Date: Friday, July 29, 2022 4:35:38 PM

UNCLASSIFIED - NON CLASSIFIÉ

Hi Jim,

By preliminary, we mean that the list has not been finalized at this time, so groups may still be added or removed, pending further review. Please disregard the single and double asterisks in the list of Indigenous nations, the asterisks were included inadvertently.

Have a fantastic weekend!

Chelsea

From: Howell, Jim <Jim.Howell@stantec.com>
Sent: July 29, 2022 4:07 PM
To: Gosselin,Nicolas (IAAC/AEIC) <Nicolas.Gosselin@iaac-aeic.gc.ca>
Cc: Fedrau,Chelsea (IAAC/AEIC) <Chelsea.Fedrau@iaac-aeic.gc.ca>; Belden, Roy S (GE Corporate) <roy.belden@ge.com>; <email address removed> ; Perret, Michele <Michele.Perret@stantec.com>; Rezac, Zoë <Zoe.Rezac@stantec.com>
Subject: RE: Preliminary list of Indigenous groups

Thanks, Nicolas. By preliminary do you mean some groups may be removed from the list or you may add other groups to the list? What do the single and double asterisks after the groups at the bottom of the list mean?

Jim

James D. Howell M.Sc., P.Geol.
Senior Principal, Environmental Services

Direct: 403 781-4119
Mobile: 403 629 3741
jim.howell@stantec.com

Stantec
200-325 25 Street SE
Calgary AB T2A 7H8

From: Gosselin,Nicolas (IAAC/AEIC) <Nicolas.Gosselin@iaac-aeic.gc.ca>
Sent: July 29, 2022 9:45 AM
To: Howell, Jim <Jim.Howell@stantec.com>

Cc: Fedrau,Chelsea (IAAC/AEIC) <Chelsea.Fedrau@iaac-aeic.gc.ca>
Subject: Preliminary list of Indigenous groups

UNCLASSIFIED - NON CLASSIFIÉ

Hi Jim

I'd like to introduce myself. My name is Nicolas Gosselin and I will be the project manager for the Moraine Initiatives Power Plant Project. Looking forward to getting to know each other.

We have put together a preliminary list of Indigenous groups that the Agency may reach out to regarding the project. This list is based on the location of reserve lands and known asserted traditional territories of Indigenous groups in relation to the approximate project location.

If you have any questions, please do not hesitate to reach out.

Thanks,

Nicolas Gosselin

Project Manager, Prairie and Northern Region
Impact Assessment Agency of Canada / Government of Canada
nicolas.gosselin@iaac-aeic.gc.ca / Tel: 343-543-0326

Gestionnaire de projets / Région des Prairies et du Nord
Agence d'évaluation d'impact du Canada / Gouvernement du Canada
nicolas.gosselin@iaac-aeic.gc.ca / Tél: 343-543-0326

Preliminary Indigenous Group Consultation List

1. Sturgeon Lake Cree Nation
2. Driftpile Cree Nation
3. Swan River First Nation
4. Sawridge First Nation
5. Sucker Creek First Nation
6. Horse Lake First Nation
7. Kapawe'no First Nation
8. Kehewin Cree Nation
9. Kelly Lake First Nation
10. Paul First Nation
11. Alexis Nakota Sioux Nation
12. Alexander First Nation
13. O'Chiese First Nation
14. Whitefish/Goodfish Lake First Nation
15. Enoch Cree Nation No. 440
16. Montana First Nation
17. Louis Bull Tribe
18. Ermineskin Cree Nation
19. Samson Cree Nation
20. Metis Nation of Alberta, Region 4
21. East Prairie Metis Settlement
22. Aseniwuche Winewak First Nation
23. Foothills Ojibway First Nation
24. Nakcowinewak Nation
25. Michel First Nation*
26. Descendants of Michel First Nation Association*
27. Friends of Michel First Nation Association*
28. Kelly Lake Métis Settlement Society**
29. Kelly Lake Cree Nation Society**
30. Métis Community Society of Kelly Lake**
31. Kelly Lake First Nation Society**
32. Foothills First Nation Heritage Society**

Confidential and Commercially Sensitive

Moraine Initiatives Limited

Developing a 465 MW gas-fired combined cycle power plant with CO_2 capture and sequestration

Discussion with Paul First Nation

July 13, 2022

Moraine is in early stages of developing an Alberta power project with CO_2 capture and sequestration

- Moraine Project (near Whitecourt, Alberta):
    - a natural gas-fired combined cycle power plant (CCGT)
    - post-combustion CO_2 capture plant (PCC)
    - CO_2 transport to and sequestration in a regional saline aquifer or other reservoir

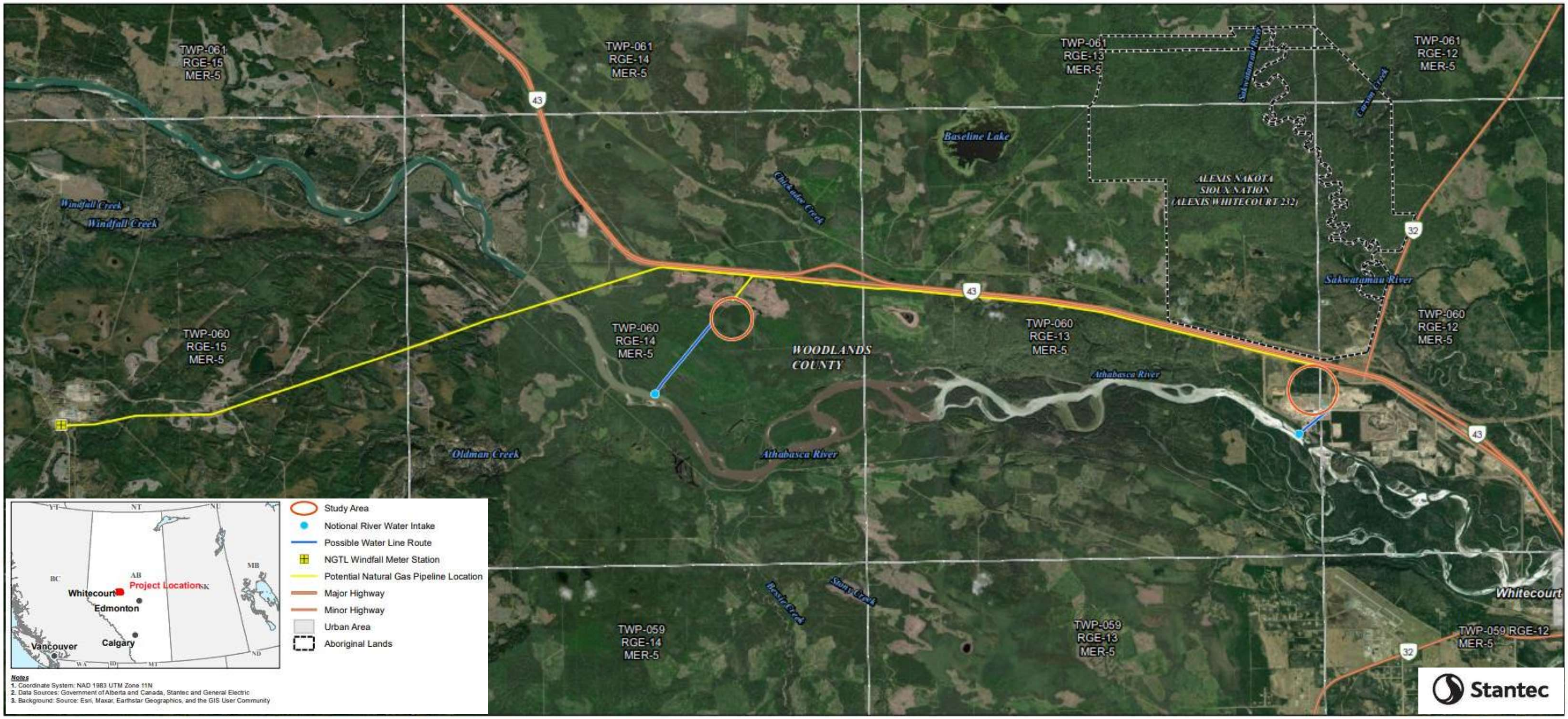
- Project Development Schedule
  - Targeting final investment decision (FID) by year-end 2023
  - Approx. 3 year construction period, with commercial in-service date in 1H 2027

Preliminary Development Plan

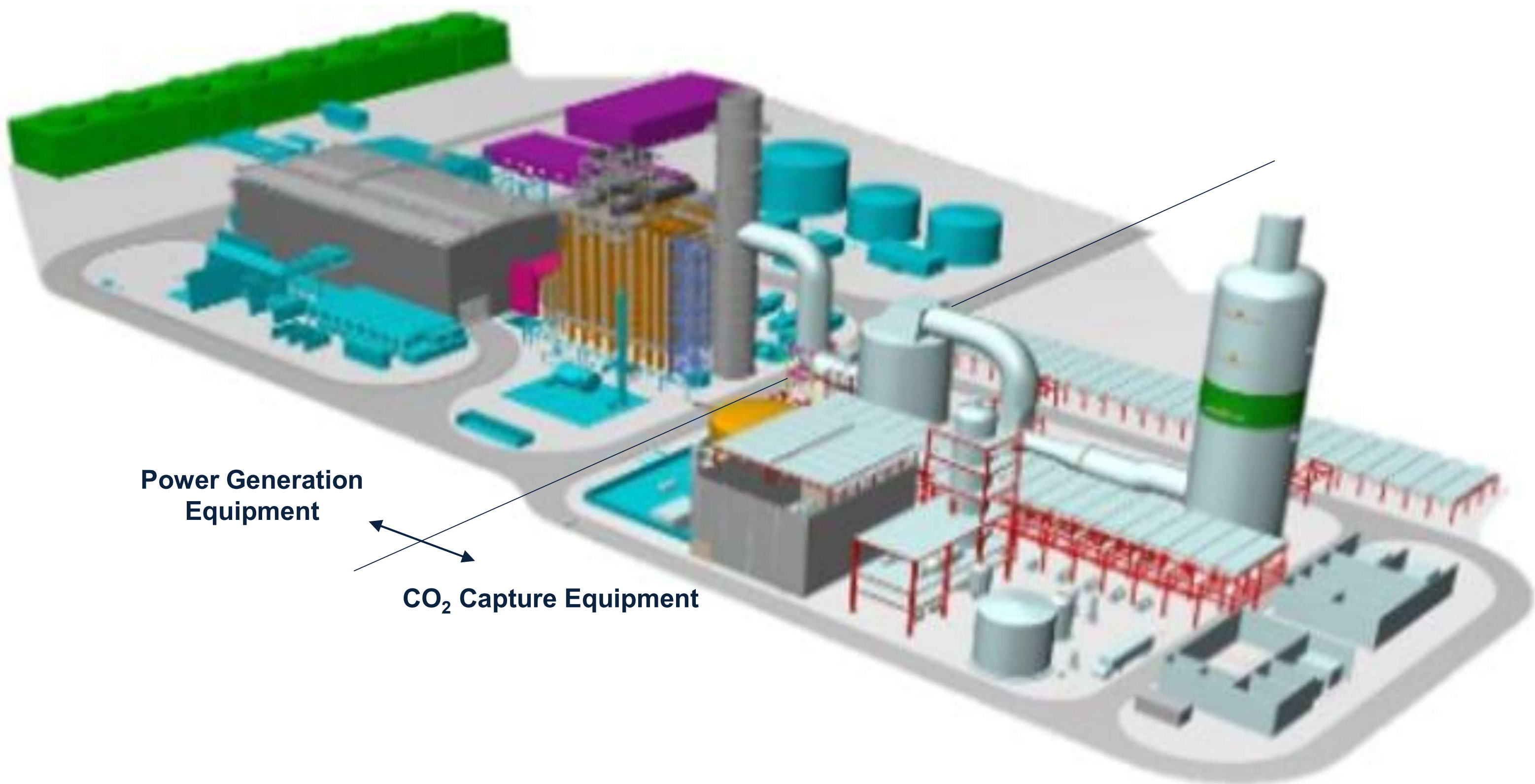
Year	2021	2022	2023	2024	2025	2026	2027
Initiate Development							
Pre-Permitting Stage							
Permitting Stage							
Construction Stage							
Operations Stage							

Confidential and Commercially Sensitive

Moraine: Proposed Project Location



Preliminary Plant Rendering*



*Rendering not to scale; Power Generation Equipment + CO_2 Capture Equipment footprint is estimated to be ~40 acres or ~1/4 of a quarter section of land

MORAINE INITIATIVES LIMITED
4000, 421 – 7 Avenue SW
Calgary, AB T2P 4K9

May 18, 2023

Reference: Moraine Power Generation Project near Whitecourt, AB

Moraine Initiatives Limited (Moraine) would like to follow up on the introductory letter that was previously sent with additional information on our proposed natural gas-fired power generation facility with integrated carbon dioxide capture located in Woodlands County near Whitecourt, AB (Project).

Moraine recently submitted an Initial Project Description (IPD) to the Impact Assessment Agency of Canada (IAAC) who are one of the federal regulators reviewing this Project. It is our understanding that you have received notification of the IPD from IAAC, or will receive this notification shortly. The attached information package is intended to complement (rather than replace) the IPD and is a high-level summary of the Project with fewer technical references.

We are interested in meeting with you to discuss the Project and its potential effect on your Treaty Rights and Traditional Uses.

Given the number of Indigenous groups that have been identified as potentially interested in this Project, we are proposing a gathering in June 2023 (exact dates to be determined). This 1 day meeting will include presentations on the Project and carbon capture sequestration, question and answer periods, opportunities for one-on-one meetings with the Moraine Team, and a site visit. We are hoping that each Indigenous group will be represented by their Consultation lead and one other community member. An invitation to this meeting, with agenda, will be sent to you once dates have been confirmed. We appreciate that the date may not work for everyone and will arrange a meeting with the Moraine Project Team at a time that is convenient for you.

As the Project advances, we will continue to reach out and provide you information, which may be associated with various regulatory permits and requirements and/or Project updates. Enclosed you will find an Information Package, which includes a map identifying general Project locations.

We request that you review the attached Information Package and contact our team with your questions and comments. Please contact Zoe Rezac, Moraine's engagement consultant with Stantec Consulting Ltd., at zoe.rezac@stantec.com or 780 917 8188.

Sincerely,

<Signature removed>

Ankur Mathur, Vice President
Moraine Initiatives Limited

cc: Zoe Rezac, Stantec
Roy Belden, Moraine Initiatives Limited
Bridget Dougherty, Moraine Initiatives Limited

Attachments:
Information Package

Moraine Initiatives Limited

Moraine Power Generation Project
near Whitecourt, AB

Project Information Package

May 18, 2023

Table of Contents

Acronyms / Abbreviations

AESO	Alberta Electric System Operator
AIES	Alberta Interconnected Electric System
AUC	Alberta Utilities Commission
CCGT	Combined-cycle gas turbine facility
CO_2	Carbon Dioxide
DCC	Direct Contact Cooler
DFO	Fisheries and Oceans Canada
ICCF	Integrated post-combustion CO_2 capture facility
kV	kiloVolt
LEG	Low-Emissions Generation of Electricity
PGF	Natural gas-fueled power generation facility
ROW	Right-of-way

1 Project Information Package

This Project Information Package provides information on a proposed natural gas-fired power generation facility (PGF) with integrated carbon dioxide (CO_2) capture located in Woodlands County near Whitecourt, Alberta (Project) that is being developed by Moraine Initiatives Limited (Moraine), which is a wholly owned subsidiary of the General Electric Company.

2 Project Purpose

The purpose of the Project is to supply reliable, affordable, and dispatchable low-emitting generation (LEG) to Albertans. By incorporating the capture of CO_2 emissions, the Project will produce near-zero emissions baseload electricity to meet the needs of Alberta electricity customers. The Project is planned to be compliant with Canada's proposed Clean Electricity Regulations and is aligned with – and a material step forward in Alberta toward – Canada's objectives of achieving net-zero emissions from the electricity grid by 2035.

3 Project Components

The Project consists of the following components:

1. Natural gas-fueled power generation facility (PGF), which is comprised of
    a. combined-cycle gas turbine facility (CCGT)
    b. integrated post-combustion CO_2 capture facility (ICCF)
2. 240 kilovolt (kV) transmission line interconnection between the PGF and existing Alberta electricity grid, the Alberta Interconnected Electric System (AIES)
3. CO_2 pipeline to convey CO_2 captured by the ICCF to the third-party Athabasca Banks CO_2 sequestration hub injection site
4. Natural gas pipeline connecting the PGF to the NOVA Gas Transmission Ltd. (NGTL) natural gas transmission network

The general location of project components is shown in Figure 1, titled Project Overview, is attached in Appendix A.

4 Project Location

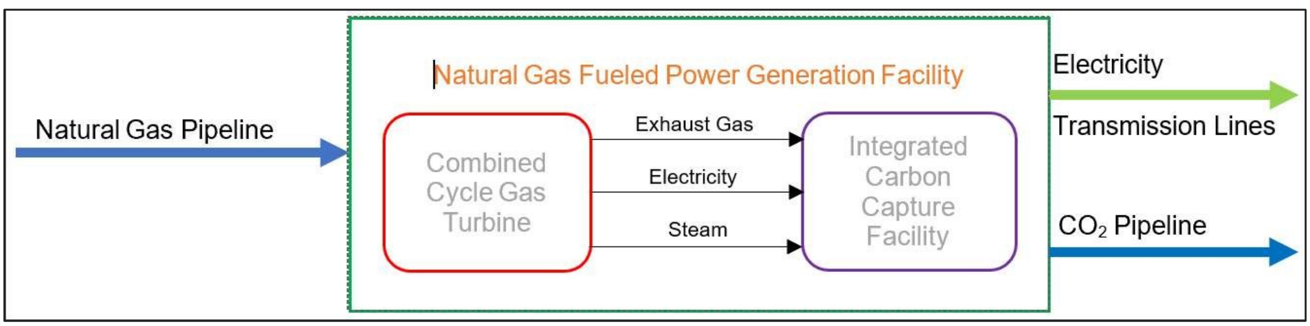
The natural gas-fueled power generation facility (PGF) is sited on 19 hectares of brownfield land located in Woodlands County approximately 10 kilometers to the northwest of Whitecourt, Alberta (AB). The ATS legal location is SW 18-60-12-W5M & NW 7-60-12-W5M; the GPS coordinates are 54.1819576376N, 115.796644173W. The site is on Alberta Crown land that is zoned as Natural Resources Extraction – Direct Control and is currently used as a gravel pit for aggregate extraction and processing.

5 Project Components

5.1 Natural Gas-Fueled Power Generation Facility (PGF)

The natural gas-fueled power generation facility (PGF) contains the combined cycle gas turbines (CCGT) and the integrated post-combustion CO_2 capture facility (ICCF). Figure 2, titled Preliminary Plant Rendering and attached in Appendix A, shows a preliminary rendering of the plant. Figure 3 below shows how the project components fit together.

Figure 3



5.1.1 COMBINED CYCLE GAS TURBINE (CCGT)

The combined-cycle gas turbine facility (CCGT) is a component of the power generation facility (PGF) and will use sweet natural gas to produce approximately 465 MW of electricity for delivery to the Alberta electrical grid, which is known as the Alberta Interconnected Electric System (AIES). “Combined cycle” means that the natural gas-fueled gas turbine generator is paired with a heat recovery steam generator to produce steam from the gas turbine exhaust heat, with a steam turbine generator producing additional electricity from this steam. The CCGT will have interconnecting water, steam, compressed air, and natural gas supply lines to operate the equipment. Natural gas will not be stored on site.

5.1.2 INTEGRATED CO_2 CAPTURE FACILITY (ICCF)

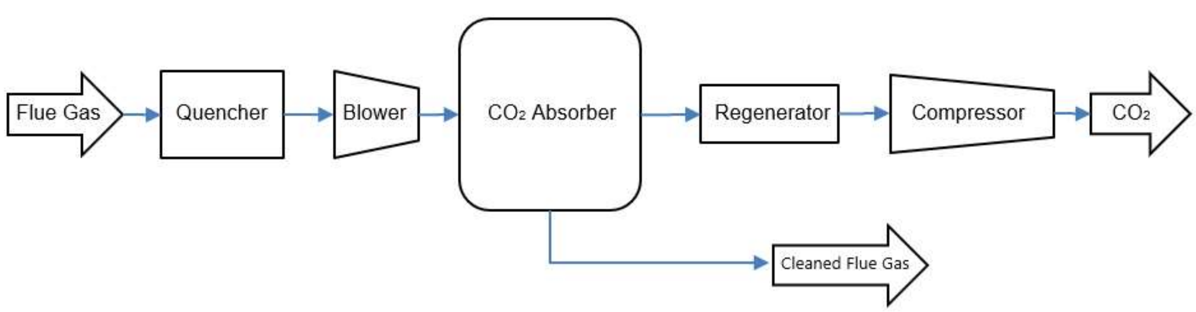
The integrated post-combustion CO_2 capture facility (ICCF) component of the power generation facility (PGF) will process the exhaust gas from the combined-cycle gas turbine facility (CCGT) and remove up to 95% of the CO_2 contained in this exhaust gas. There are several technologies capable of removing CO_2 from natural gas-fired power generation plant exhaust. However, among this range of technologies, only the amine-based regenerative liquid absorbent process has been technically and economically proven in commercial applications at a scale similar to, or larger than, that of the Project.

Amine-based CO_2 removal units have been widely used in Western Canada in the processing of natural gas since the mid-20th century. Thus, there are several decades worth of design, construction and operating experience across many dozens of amine-based gas processing units in Western Canada. The amine process to be used in the ICCF is very similar to that of these natural gas treating plants operating in Alberta today.

The ICCF contains five important pieces of equipment that are described below and illustrated in Figure 4:

- A Quencher (also called a Direct Contact Cooler or DCC) to reduce gas turbine exhaust temperature entering the process.
- A Blower (or Induced Draft Booster Fan) to ensure the gas turbine exhaust continues moving through the CO_2 capture process.
- An amine-based CO_2 Absorber that removes most of the carbon dioxide from the gas turbine exhaust stream by absorbing it into an amine solution. Treated gas turbine exhaust with greatly reduced CO_2 content is directed back to its exhaust path to atmosphere from this component step.
- The CO_2 -loaded amine ("rich amine") moves into the Regenerator where CO_2 is boiled out of the amine using heat from a steam source. Regenerated amine is then cooled and cycled back to the absorber to capture more CO_2.
- Finally, the captured CO_2 is directed into a Compressor to pressurize and dehydrate the CO_2 gas for the power generation facility (PGF) CO_2 export pipeline requirements. The CO_2 is then transported by pipeline away from the PGF toward its approved sequestration point.

Figure 4 Amine-based ICCF



All of the Project components are located within Woodlands County in Alberta. The layout of the equipment in the PGF is shown in Figure 5, titled General Layout of the Moraine Power Plant, and included in Appendix A.

5.2 Transmission Lines

Electricity generated by the combined-cycle gas turbine (CCGT) will be transmitted to the Alberta electrical grid (AIES) along a new 240 kV transmission line. Two interconnection options have been proposed by the Alberta Electric System Operator (AESO) and are currently undergoing technical studies. These are indicated on the Project Overview Figure1 included in Appendix A. Both options require 10 km of new transmission line right-of-way (ROW) adjacent to the ROW of an existing 240 kV transmission line but have different interconnection options thereafter.

Interconnection Option 1 proposes constructing a single new 240 kV circuit of about 10 km length paralleling existing 240 kV circuit 907L to tie into existing transmission line 9L938 (between the Sagitawah 77S switchyard and the Louise Creek 809S switchyard) with a T-tap configuration.

Interconnection Option 2 constructing a single new 240 kV circuit of about 20 km total length to the Sagitawah 77S switchyard. The first 10 km of this new circuit is identical in routing to Interconnection Option 1 (i.e., parallel to existing 907L). Rather than tying into transmission line 9L938, the new line is proposed to be strung on the existing open side of the tower structures of 9L938 for the remaining 10 kilometers and tie in at the switchyard instead. This option would include upgrading the Sagitawah 77S switchyard by adding one new 240 kV circuit connection and adding or modifying equipment as necessary.

5.3 CO_2 Pipeline

A pipeline will be needed to transport the CO_2 from the power generation facility (PGF) to a third-party CO_2 sequestration hub northwest of Whitecourt. The CO_2 sequestration hub is not part of the Project. The pipeline route being considered parallels existing disturbances where possible, including existing natural gas pipeline rights-of-way and Highway 43. The CO_2 pipeline will be approximately 12 km in length and will be regulated by the Alberta Energy Regulator (AER).

5.4 Natural Gas Pipeline

The power generation facility (PGF) will be fueled by sweet natural gas. It is anticipated the natural gas will be sourced from the existing Nova Gas Transmission Ltd. system at the Windfall Meter Station. A pipeline, approximately 30 km in length, will be built to transport the natural gas from the Windfall Meter Station to the PGF. The pipeline route is in development; however, a likely route parallels existing disturbance for the majority of the route including existing natural gas pipeline rights-of-way. The preferred route is shown in Figure 1, titled Project Overview, and is attached in Appendix A. The pipeline will be regulated by AER and deliver approximately 85,000 GJ/d of sweet natural gas.

6 Construction Timelines and Anticipated Activities

Subject to receipt of regulatory and other approvals, construction of the Project is anticipated to start Q3 2024, with the Project planned to enter commercial service in Q3 2027. The table below describes the project schedule and anticipated construction activities for the Project.

Date	Anticipated Activities
Q2 and Q3 2023	Field Surveys and Technical Studies • Geo-technical investigation • Environmental reviews including: - Vegetation surveys to assess rare plants, rare ecological communities, or from the introduction and spread of weeds - Wildlife habitat assessments - Aquatics field-based habitat assessment at Athabasca River and Chickadee Creek - Soils surveys to assess topsoil depths and provide salvage recommendations
Q2 2023 thru Q2 2024	Permits and approval applications
Q3 2023- Q3 2024	Preliminary engineering
Q4 2024 start	Construction including: • Clearing vegetation • Access road construction • Surface preparations • Foundation excavation, pilings, and underground piping • Building construction including mechanical, electrical, and switchyard construction • Installation of major equipment • Connection of process and ancillary equipment • Site drainage and erosion control • Site clean-up and restoration
Q3 2027	Startup / commissioning
Q4 2027	In service
> 2068	Project decommissioning (after estimated 40-year life)

7 Regulatory Requirements

The Project is subject to federal, provincial, and municipal regulatory requirements:

Federal Acts:

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

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

- *Hydro and Electric Energy Act*
- *Electric Utilities Act*
- *Environmental Protection and Enhancement Act*

- *Water Act*
- *Historical Resources Act*
- *Public Lands Act*
- *Pipeline Act*

Regulatory requirements from the Woodlands County and Town of Whitecourt that may affect the Project:

- Woodlands County Municipal Development Plan Bylaw #406/13
- Woodlands County Land Use Bylaw 490/17
- Intermunicipal Development Plan for Woodlands County and the Town of Whitecourt Bylaw 401/12

8 Project Operations

The Project will be owned by Moraine and operated by an experienced third-party operator. Day to day operation and maintenance will be provided by a staff of operators, engineers, and support staff totaling approximately 32 persons.

The turbine and generator manufacturer will provide major maintenance and inspection work.

The Project will generally operate as a baseload facility, i.e., normally always operating at or near full capacity, subject to outages and planned shutdowns.

Natural gas will be delivered to the power generation facility (PGF) site by a pipeline and combusted in the combined-cycle gas turbine (CCGT) to generate electricity. The exhaust gases from the CCGT are processed in the integrated post-combustion CO_2 capture facility (ICCF) to remove up to 95% of the CO_2 from this CCGT exhaust stream.

CO_2 captured in the ICCF will be transported through a CO_2 pipeline to a third-party CO_2 sequestration hub.

The electricity generated will be supplied to the Alberta electrical grid (AIES).

8.1 Water Supply, Wastewater Disposal, and Stormwater Management

The power generation facility (PGF) will principally use aerial cooling for its process cooling needs, which greatly reduces water demands compared to similar projects that use water for cooling. Nonetheless, the PGF has a need for modest volumes of freshwater for uses such as boiler feedwater treatment makeup. It is planned to meet this water demand by constructing and operating a new groundwater supply system as part of the Project.

The PGF process wastewater discharges will be temporarily stored on-site and disposed of in deep geological formations via disposal wells.

Stormwater that falls on the PGF site will be collected in a stormwater retention pond. This stormwater will be released to the environment once monitoring confirms that it meets quality requirements to be released. Any contaminated stormwater will be disposed of via approved disposal facilities.

9 Potential Effects from Project

The Project considered the potential effects it may have on the environment during construction and operations. Consideration was given to:

- Air Quality
- Acoustic Environment (Noise Emissions)
- Groundwater
- Soils
- Vegetation and Wetlands
- Surface Water and Fish and Fish Habitat
- Wildlife and Wildlife Habitat including Species at Risk and Migratory Birds

9.1 Air Quality

Air emissions during the construction phase may result from construction equipment exhaust and from dust associated with construction activities. During operations, emissions will result from the combustion of natural gas in the production of electricity.

Mitigation measures during construction will be put in place to minimize emissions such as:

- Vehicles and equipment will be required to meet emission control standards
- Diesel fuel will have sulphur limits
- Construction vehicle idling times will be reduced to the extent possible to reduce emissions
- watering roads during construction activities.
- Disturbed surfaces will be revegetated promptly following construction to prevent wind erosion and to control dust.
- Surfaces of temporary soil and overburden stockpiles will be stabilized during extended periods between usage, by means of vegetating or covering the exposed surfaces.
- Silt fences and other erosion control methods such as mulching and application of tackifiers will be used to prevent soil loss from soil stockpiles due to wind erosion.

Mitigation measures during operations will include:

- The power generation facility (PGF) will include advanced pollution control technologies to minimize emissions.

9.2 Acoustic Environment (Noise Emissions)

Noise emissions during the construction phase will arise from construction equipment and vehicles. During operations there will be noise emissions from the operation of the power generation facility (PGF). A noise impact assessment will be completed for the Project as per Alberta Utilities Commission (AUC) Rule 12.

Mitigation measures during construction will include:

- Construction activities will be limited to the daytime period.
- Noise abatement equipment on vehicles and machinery will be maintained in good working order.
- Minimize vehicle and equipment idling.
- Residents near to construction noise-generating activities will be notified prior to construction.
- A complaint response procedure will be implemented to address noise complaints should they arise.

Mitigation measures during operation will include:

- Enclosers will be used on equipment to reduce noise emissions.
- Noise reduction features will be used on Project equipment.
- Noise attenuation measures on air cooled condensers and/or air-cooled heat exchangers will be included in design.

9.3 Groundwater

During construction of the power generation facility (PGF), pipelines, and transmission line, the Project has the potential to change groundwater quantity and quality as a result of drilling of extraction wells, excavation and potential dewatering activities, and from accidental spills in areas where groundwater is shallow.

During operation, the Project has the potential to result in a change to groundwater quantity as water supply for the operation could include a groundwater diversion for operations and as the source for process water. A change in groundwater quality could also occur because of accidental spills during operation, although the effects of accidental spills is expected to be limited based on the planned design and operation of the Project. Further analysis and characterization of the shallow groundwater near the PGF site are planned in the next phase of the Project.

Mitigation measures during construction include:

- Monitor water levels in all open excavations.
- Limit the amount of time that a trench is left open.
- Discharge water away from drainage courses, water bodies and wetlands; appropriate locations for discharge will be identified during construction by a qualified environmental monitor.
- Monitor the water discharge site for signs of erosion, saturation of the discharge site or flow off of the approved release area. Suspend dewatering and apply erosion control measures, reduce the flow or move the discharge site if it appears that the above effects are occurring.

- In the event that contaminated, or potentially contaminated soil or water is encountered, implement contamination management and contingency plans.
- Develop and implement procedures to manage the risk of spills.
- In the event of a spill, efforts to contain, remove or remediate any contaminant(s) causing environmental effects shall be completed.
- 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.

Mitigation measures during operations include:

- Monitoring of the groundwater network both for potential contaminants related to operation of the PGF and to limiting the groundwater withdrawal to the calculated rate for consumption.

9.4 Soils

During construction of the pipelines, soil will be stripped and stockpiled in rows along the ROWs. For the transmission line, soil disturbance will be limited to areas where there are towers, or other infrastructure. These soils will be stockpiled for reclamation.

Following completion of power generation facility (PGF), pipeline and transmission line construction and post-construction reclamation of the pipeline and transmission line ROWs, no effects on soil are anticipated.

Mitigation measures during construction include best management practices for handling soil during construction projects.

Mitigation measures during operations are not expected to be required.

9.5 Vegetation and Wetlands

Limited effects on native vegetation and wetlands associated with construction of the power generation facility (PGF) are anticipated as the majority of the PGF site has been stripped during previous aggregate quarrying and only a small patch of native vegetation remains. During construction of the pipelines and transmission line, natural vegetation will be cleared, and wetlands may be temporarily disturbed.

Following completion of PGF, pipeline and transmission line construction and post-construction reclamation of the pipeline and transmission line ROWs, no new operations phase effects on native vegetation and wetlands are anticipated.

Mitigation measures during construction include:

- Activities will be restricted to the Project footprint to minimize vegetation loss.
- Do not allow clearing or grubbing beyond the marked construction temporary workspace boundaries.
- Where grading is not necessary, implement minimum surface disturbance techniques to assist in maintaining an intact ground surface.
- Limit clearing of trees at watercourse crossings to the area required to complete the construction.

- Where practical, leave stumps in place, particularly on streambanks, to provide surface stability.
- Salvage merchantable timber according to the requirements of the forest management agreement holder.
- Reclaim disturbed areas according to requirements of the provincial land manager. This may include natural revegetation, seeding and/or shrub staking.

Mitigation measures during operations are not expected to be required.

9.6 Surface Water and Fish and Fish Habitat

Based on the location, construction of the power generation facility (PGF) is not expected to affect surface water, fish, or fish habitat. Construction of all pipeline and transmission line across the Athabasca River and its tributaries will be assessed for fish and fish habitat, prior to finalizing crossing methods and to identify potential effects and appropriate mitigation.

Construction of pipelines and transmission lines could increase sediment in surface water and affect flow patterns, habitat structure, bank stability, and temporary loss of riparian habitat. Fish mortality is also a risk.

During Project operations, there are no anticipated effects to surface water, fish, and fish habitat based on water use. Process water from the operation of the PGF will be contained in a closed loop system and stored in appropriate tankage on site prior to disposal to an approved location. Therefore, no interactions with surface water or fish and fish habitat will occur.

The stormwater pond will be designed to collect surface water runoff from the PGF and will have appropriate liners for the retention of liquids or compacted material to retain water and prevent leaching of water into soil, groundwater, or unmitigated flow offsite.

Mitigation measures during construction include:

- Develop and implement an erosion and sediment control plan that reduces the risks of sedimentation into crossed watercourses during construction.
- Spill containment kits must be present on site in designated locations where risk of spill is deemed the greatest (e.g., refueling areas).
- Complete dewatering in a manner that does not cause erosion or allow sediment to re-enter a watercourse or water body through the use of appropriate sediment control devices.
- Do not store hazardous materials, chemicals, fuels, or lubricants within 100 m of watercourses.
- Do not use herbicides for clearing or maintenance of riparian vegetation unless approved by Fisheries and Oceans Canada (DFO). Do not remove riparian vegetation if the riparian area is identified as part of critical habitat of an aquatic listed species at risk unless authorized by DFO.
- Develop and implement an erosion and sediment control plan that reduces the risks of sedimentation into crossed watercourses during construction.
- Use clean materials for construction, free of fines and debris.
- Repair erosion and sediment control measures and structures if damage occurs.

- Limit disturbance of the banks, and stabilize and reclaim the site to pre-construction conditions, as soon as possible after construction.
- Machinery will arrive on site in a clean condition and maintained free of fluid leaks.
- Schedule work to avoid wet, windy, and rainy periods to reduce the risk of erosion and sedimentation.
- Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent deleterious substances from entering the water.

Mitigation measures during operations are not expected to be required.

9.7 Wildlife and Wildlife Habitat including Species at Risk and Migratory Birds

Limited effects on wildlife habitat associated with construction of the power generation facility (PGF) are anticipated as the majority of the site has been stripped during quarrying and only a small patch of native vegetation remains. Following completion of the PGF, pipeline and transmission line construction, and post-construction reclamation of the pipeline and transmission line ROWs, the majority of potential effects will cease.

Project operation will have negligible residual effects on wildlife and wildlife habitat. As the PGF will be void of vegetation, wildlife use is anticipated to be low and temporary.

Mitigation measures during construction include:

- Ensure that noise abatement equipment on the facility is maintained in good working order.
- Ensure that noise abatement equipment on vehicles and machinery is maintained in good working order.
- Minimize vehicle and equipment idling.
- Facility lighting will be as efficient as possible, while providing enough light to make the site safe and secure.
- Perimeter lighting will be directed inward towards the PGF to minimize light trespass to the environment and surrounding areas as much as possible.
- Install bird nest and perch deterrents to protect birds and infrastructure according to industry standards.

Mitigation measures during operations are not expected to be required.

10 Traditional Land Use, Physical and Cultural Heritage, and Historical, Archaeological and Paleontological Resources

The Project will continue to engage Indigenous groups to better understand historical resources and cultural aspects of the area. As the Project footprint is further defined, a Historic Resources Application will be prepared and submitted to Alberta Culture for review. Mitigation measures will be completed as directed by Alberta Culture including activities such as avoidance of impact through project redesign, field-based impact assessments (archaeology and/or paleontology), site-specific mitigation measures (e.g., controlled surface collection of cultural materials, archaeological excavation, documentation of historical structures activities).

11 Indigenous Health, Social, and Economic Conditions

Potential effects on Indigenous health will be evaluated when air quality modelling and the noise impact assessment are completed. Socio-economic effects are anticipated to be positive for Indigenous groups due to opportunities for employment during construction and operation of the Project. Opportunities for socio-economic effects will continue to be reviewed as the Project proceeds.

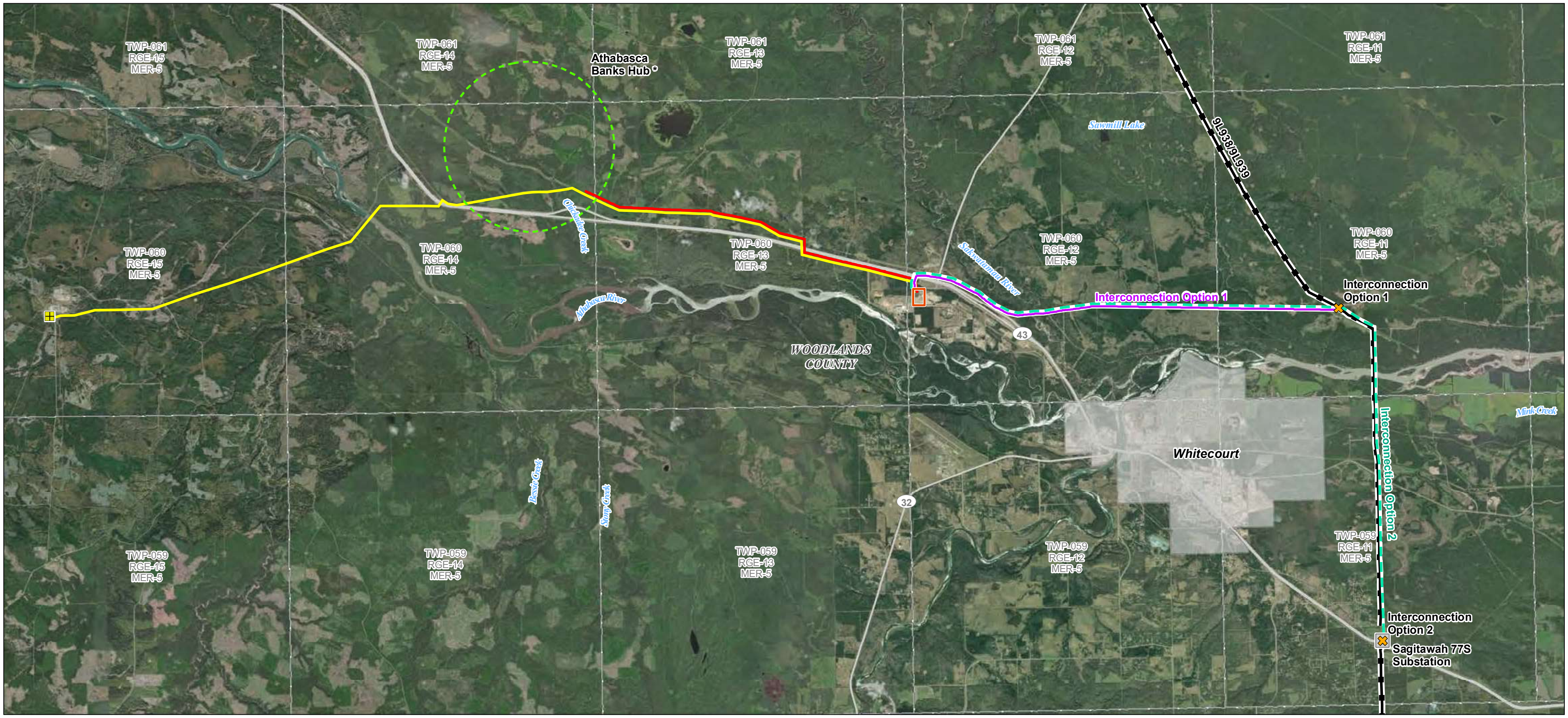
12 Request to Meet and Contact Information

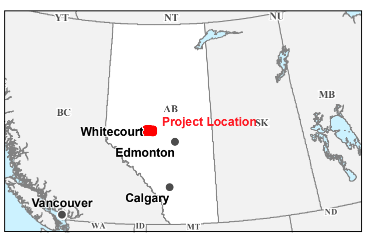
Moraine is interested in understanding how the Project may be of interest or concern to your Indigenous group's membership. We request that you review the information included in this package and advise us whether the proposed Project may adversely impact the Treaty Rights and Traditional Uses of your Indigenous members who may use the Project area.

We would be pleased to discuss the Project further with you by phone, email, or meeting. To schedule a meeting please contact Zoe Rezac, Moraine's engagement consultant with Stantec Consulting Ltd, at zoe.rezac@stantec.com or 780-917-8188.

APPENDIX A
Figures

Appendix A Figures





- Interconnection Site
- Existing Substation
- NGTL Windfall Meter Station
- Interconnection Option 1
- Interconnection Option 2
- Preferred CO_2 Pipeline Route
- Preferred Natural Gas Pipeline Route
- Athabasca Banks Hub
- Proposed Facility
- AESO 240 kV Transmission Line
- Township
- Urban Area

* - Connection Point(s) within Hub area to be determined

0 1 2 3 4 Kilometres
(At original document size of 11x17)
1:125,000

N

Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Government of Alberta and Canada, Stantec and General Electric
3. Background Image: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Stantec

Project Location
Whitecourt,
Alberta

Prepared by SL on 2023-02-13
TR by SM on 2023-02-13
IR Review by JD on 2023-02-13

Client/Project 110220760-010
Client: Moraine Initiatives Ltd.
Project: Moraine Power Generation Project
Initial Project Description

Figure No.
1

Title
Project Overview

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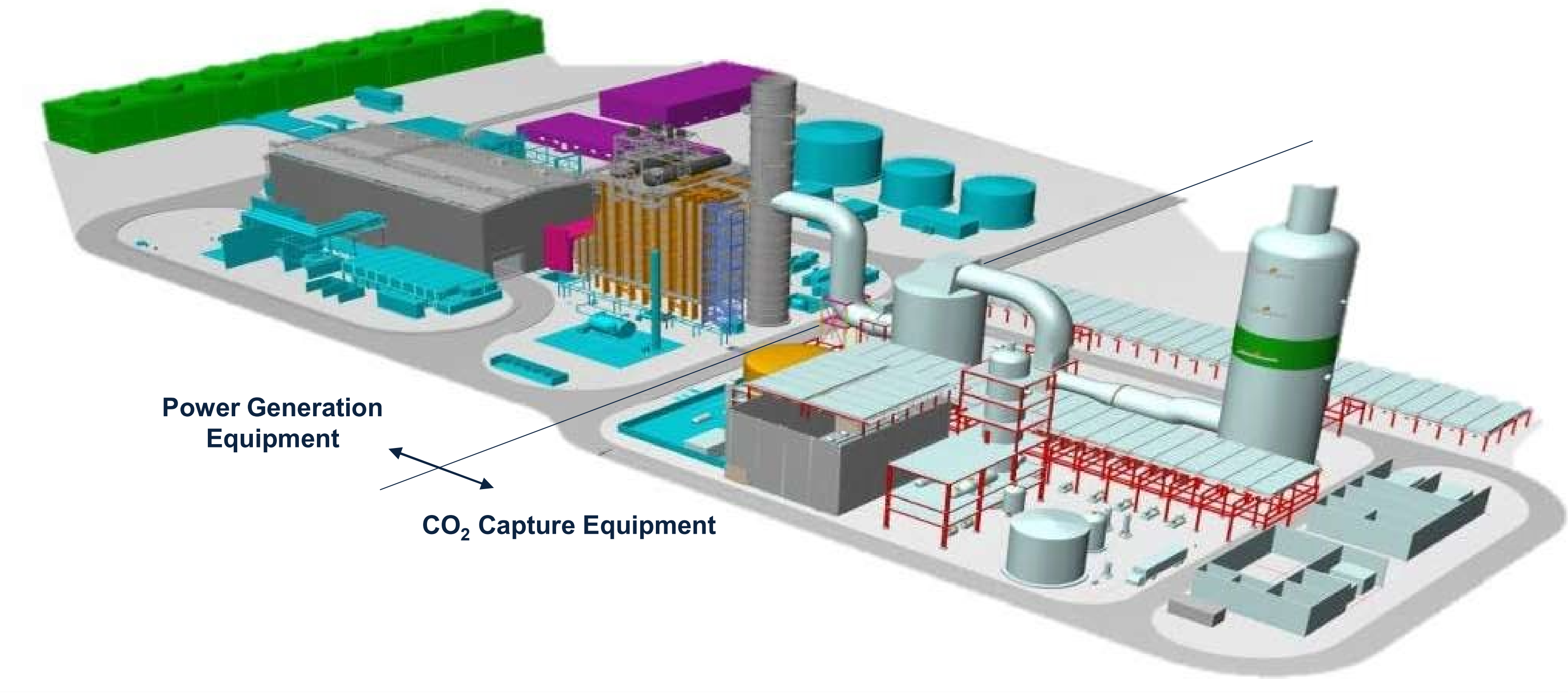
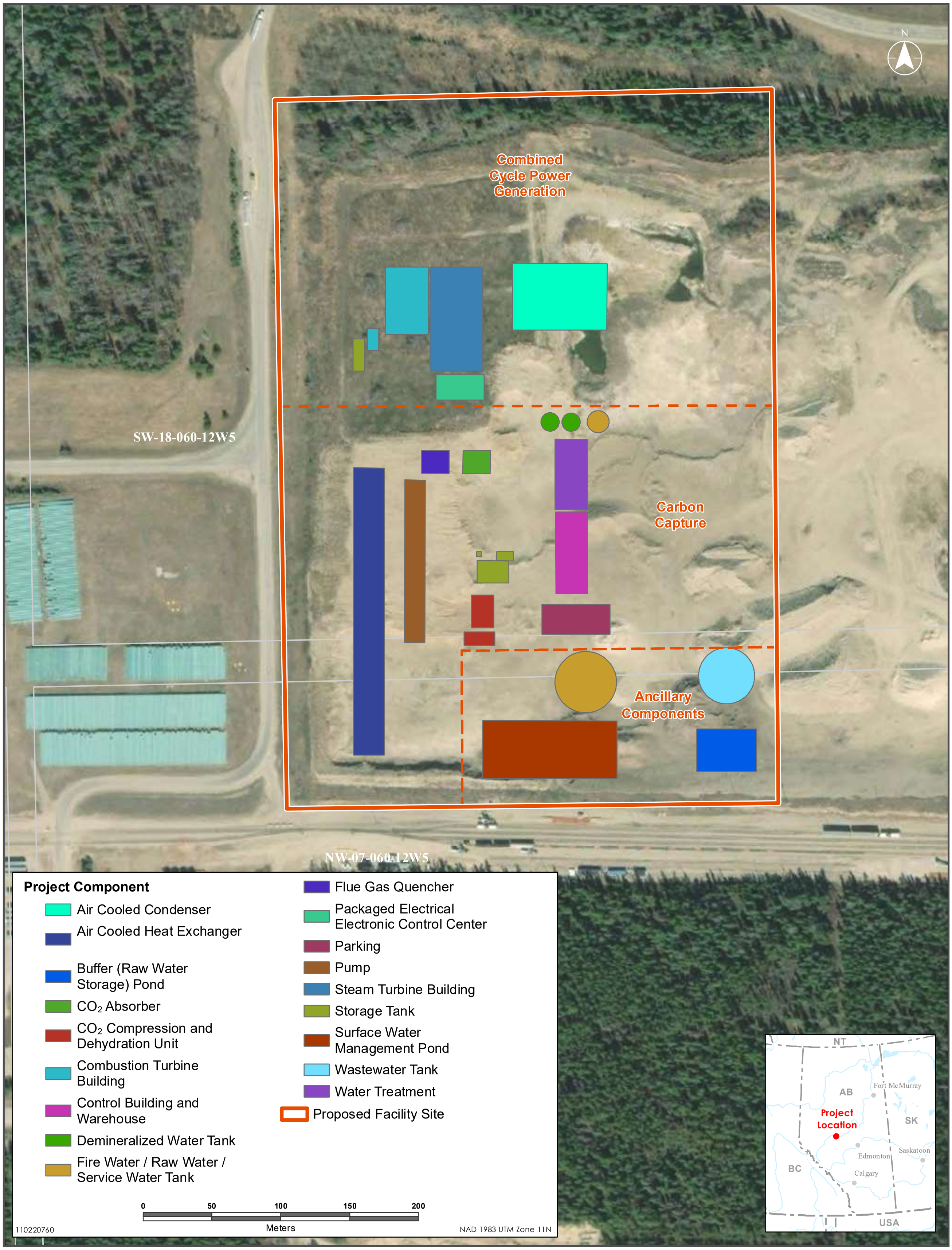
Preliminary Plant Rendering*



*Rendering not to scale; Power Generation Equipment + CO_2 Capture Equipment footprint is estimated to be ~40 acres or ~1/4 of a quarter section of land

Figure No.
2
Title
Preliminary Plant Rendering



Sources: Base data provided by the Governments of Canada, and Alberta.
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Stantec

Figure No.
5

Title
General Layout of the Moraine Power Plant

Moraine Power Generation Project

MORAINE INITIATIVES LIMITED

JUNE 27, 2023

Introductions

Agenda

Time	Description	Location
8:00 am	Breakfast	Dining Room
9:00 am	Opening Prayer and Welcoming Remarks	Grand Foyer
9:25 am	Moraine Project Presentation – Q/A	Grand Foyer
10:30 am	Break	
10:45 am	Moraine Project Presentation – Q/A (cont.)	Grand Foyer
11:30 am	CO_2 Sequestration Presentation - Q/A	Grand Foyer
Noon	Lunch	Dining Room
1:00 pm	Site Visit Tour in Lobby **OR** One-on-One Mtg	**Please Sign Up**
5:00 pm	Dinner	Dining Room
6:00 – 9:00 pm	One-on-One Meetings	**Please Sign Up**

Moraine Initiatives Limited

Moraine Power Generation Project is owned by Moraine Initiatives Limited (a wholly owned subsidiary of the General Electric Company)

Ankur Mathur
Project Lead

Roy S. Belden
Environmental Manager/ Counsel

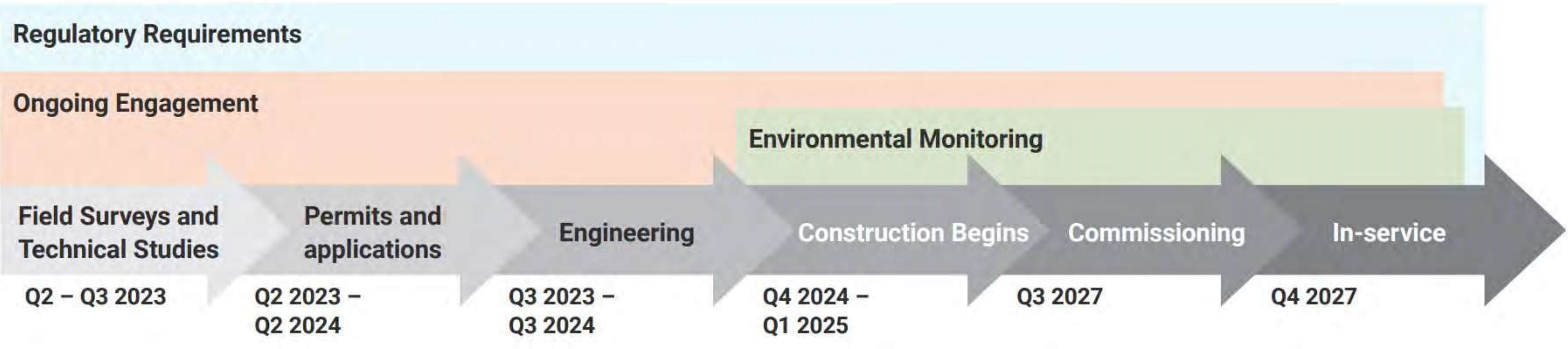
Bridget Dougherty
Development Manager

John Nutter
Technical Manager

Moraine Power Generation Project

- The Project will supply reliable, affordable, and clean electricity
- Produce 465 MW of near-zero CO_2 emission electricity
- Compliant with Canada's proposed Clean Electricity Regulations
- Meet Canada's objectives of achieving net-zero emissions from electricity grid by 2035

Project Overview

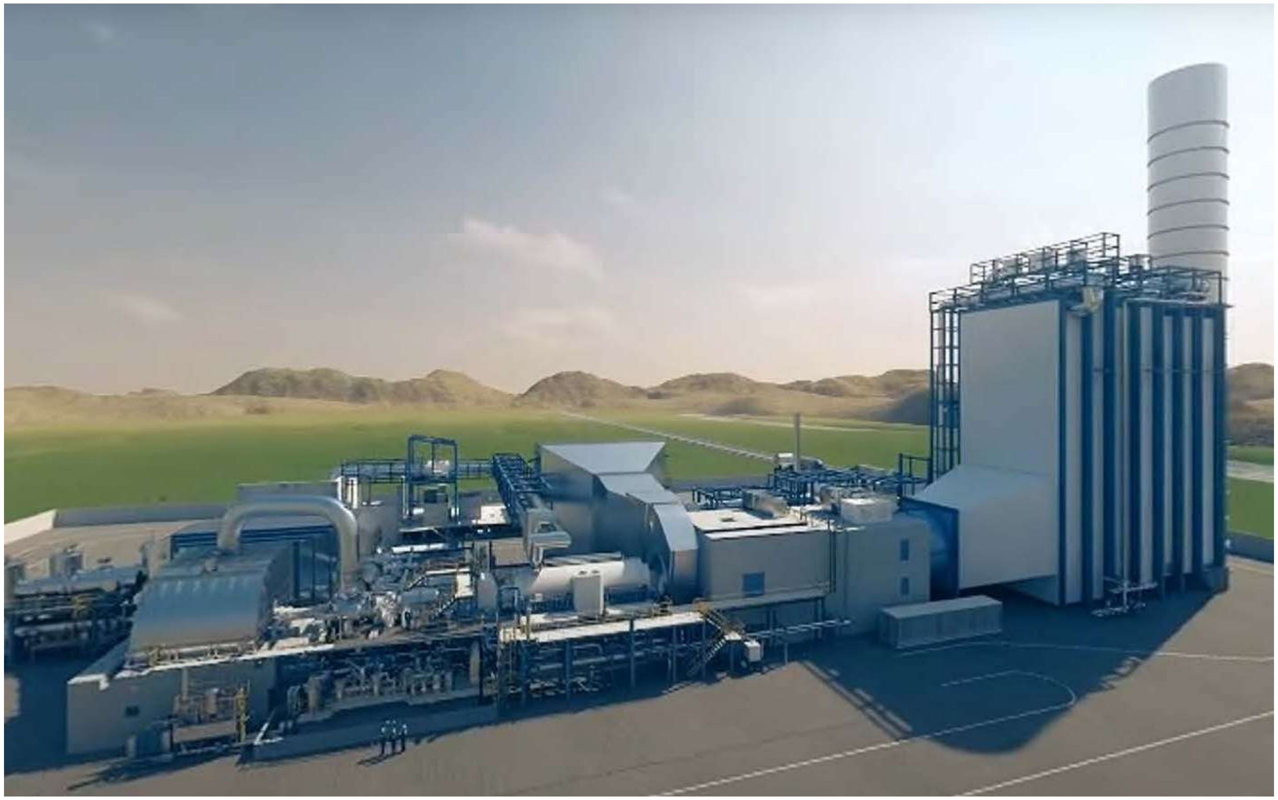


Project Schedule

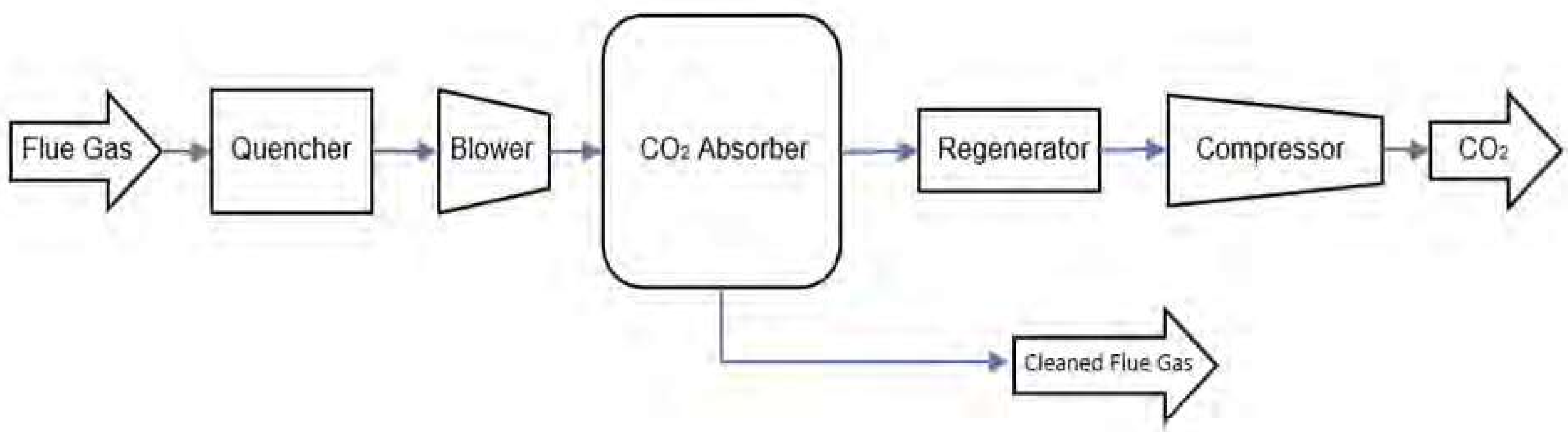
Moraine Power Generation Project

- Power Generation Facility Site:
  - Combined-Cycle Gas Turbines
  - Integrated Post-Combustion CO_2 Capture Equipment
- Fueled by Sweet Natural Gas
- CO_2 captured from emissions is transported by pipeline to a sequestration hub

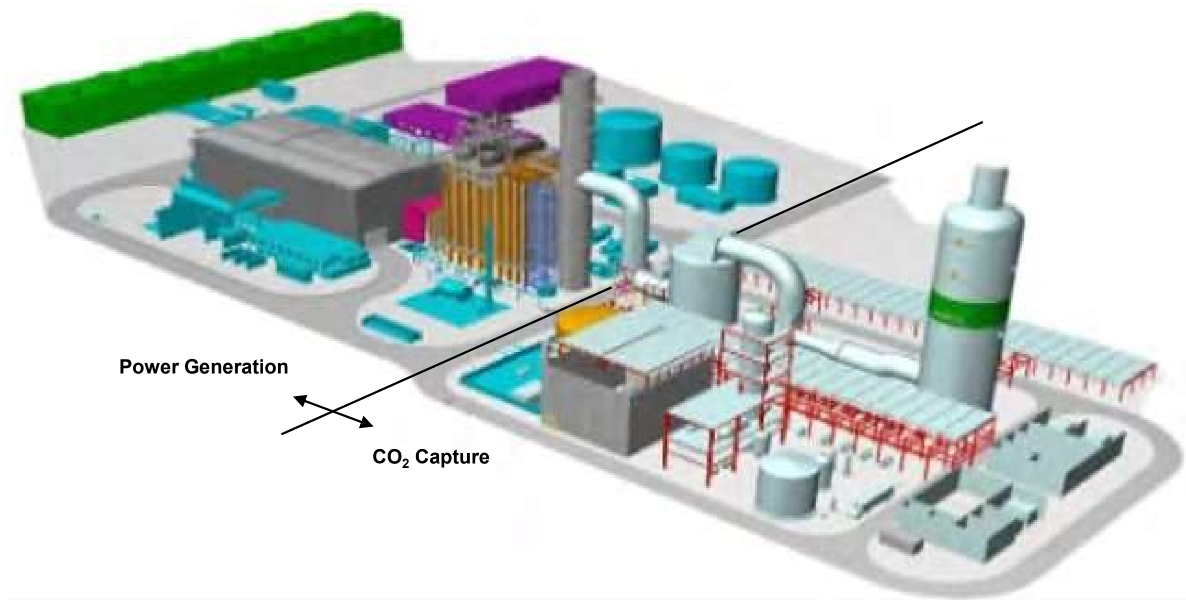
Combined Cycle Gas Turbine



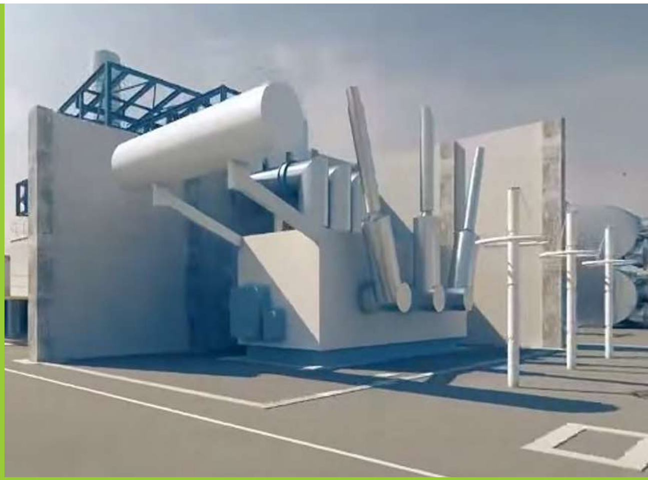
Process Flow CO_2 Capture



Preliminary Plant Rendering



*Rendering not to scale; Power Generation Equipment + CO_2 Capture Equipment footprint is estimated to be ~40 acres or ~1/4 of a quarter section of land



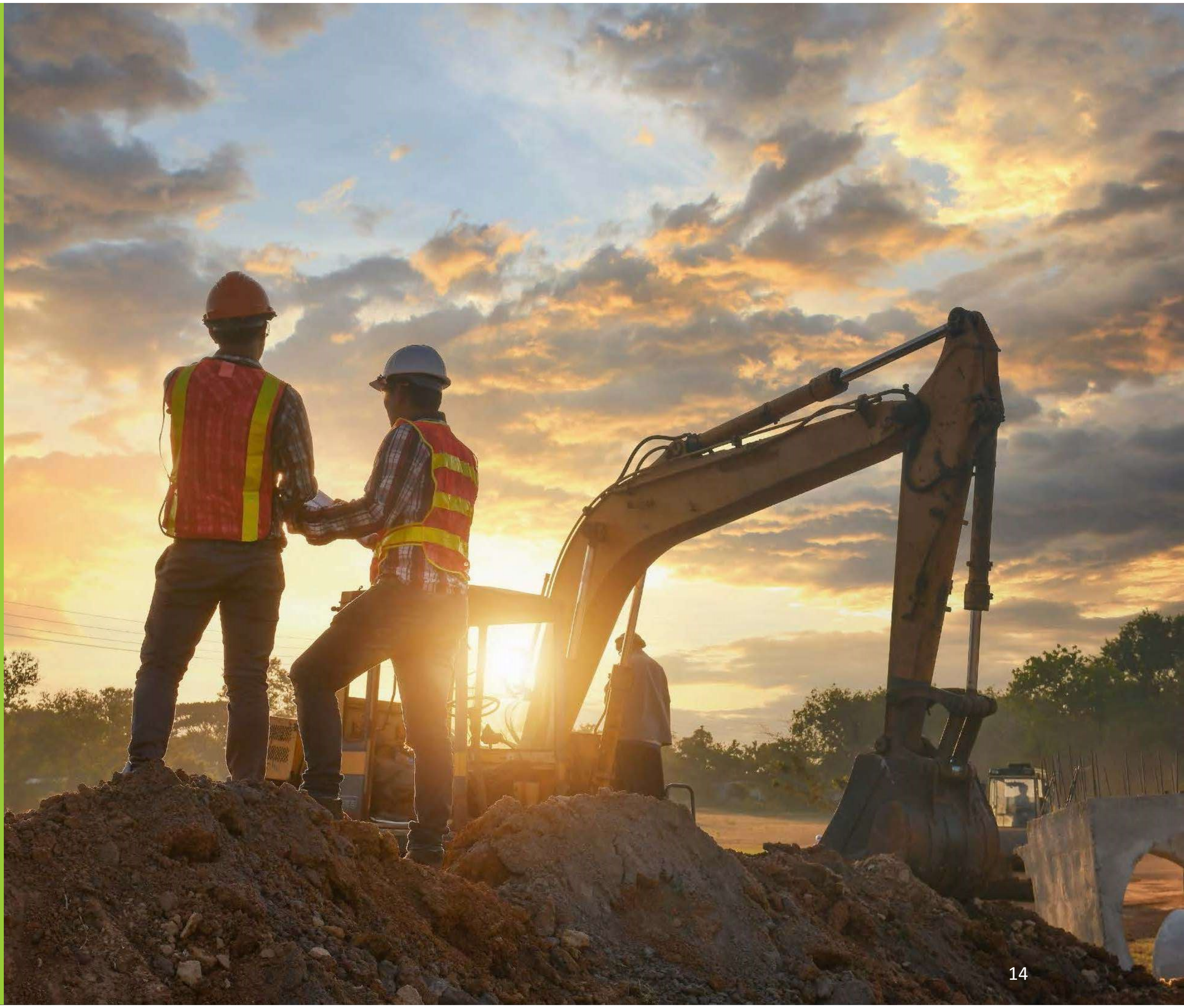
Transmission Line

Pipelines

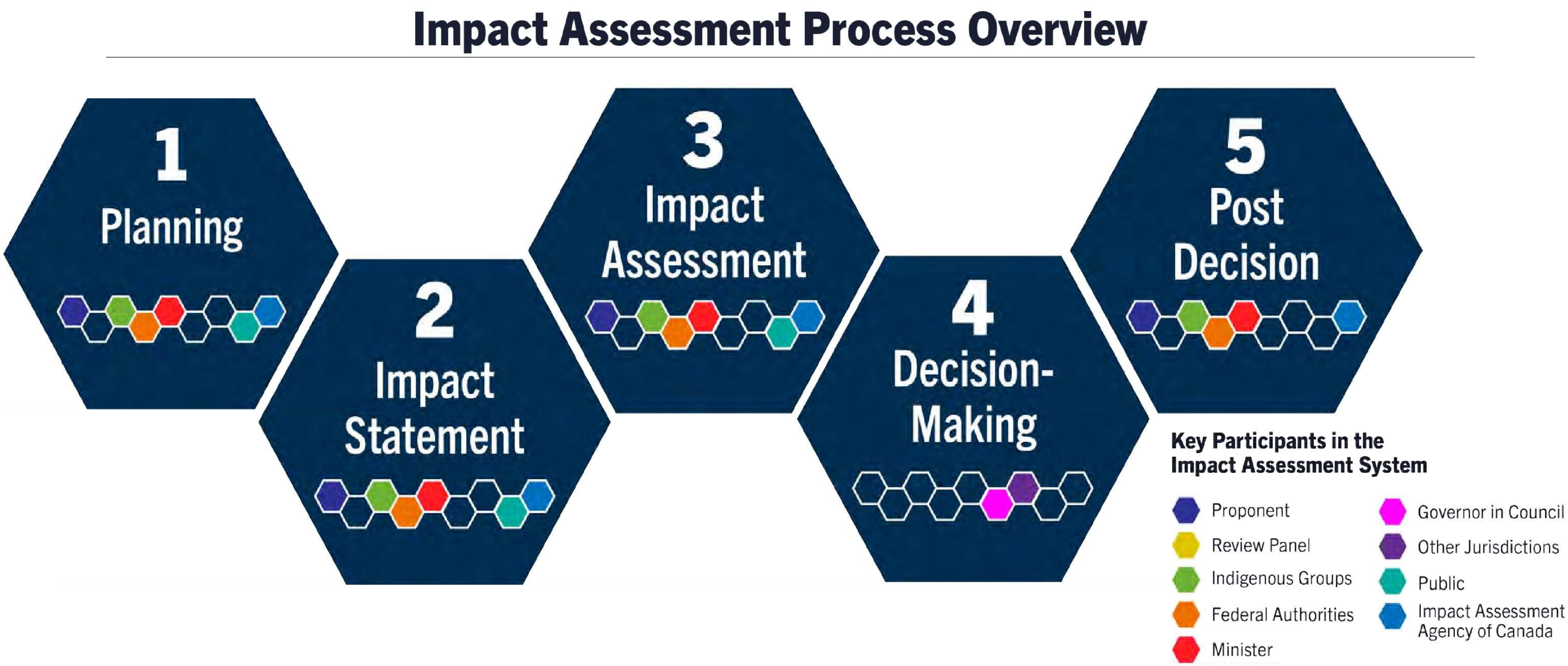
Construction

Expected to take:

- 3 years
- Construction workforce of approximately 600-700 people
- Once complete will employ approximately 32 operators, engineers, and support staff



Federal Impact Assessment Act



Provincial Permits and Approvals

Facility	Pipelines	Transmission Line
• Impact Assessment Act • Species at Risk Act • Migratory Bird Convention Act • Environmental Protection and Enhancement Act • Alberta Utilities Commission Act/Hydro and Electric Act • Alberta Water Act • Alberta Public Lands Act • Alberta Municipal Government Act	• Migratory Bird Convention Act • Fisheries Act • Species at Risk Act • Pipelines Act • Oil and Gas Conservation Act • Alberta Public Lands Act • Alberta Water Act • Historical Resources Act	• Species at Risk Act • Migratory Bird Convention Act • Alberta Electric System Operator • Alberta Electric Utilities Act • Alberta Public Lands Act • Historical Resources Act

Physical Environmental Considerations

Areas of focus for the Project include:

Air Quality	Noise	Groundwater	Soils
Surface Water, Fish & Fish Habitat	Historical Resources	Vegetation & Wetlands	Wildlife & Wildlife Habitat

Potential Effects: Power Generation Facility

- Emissions
- Noise
- Vegetation
- Wildlife
- Accidental spills/releases
- Groundwater withdrawal

Mitigations: Power Generation Facility

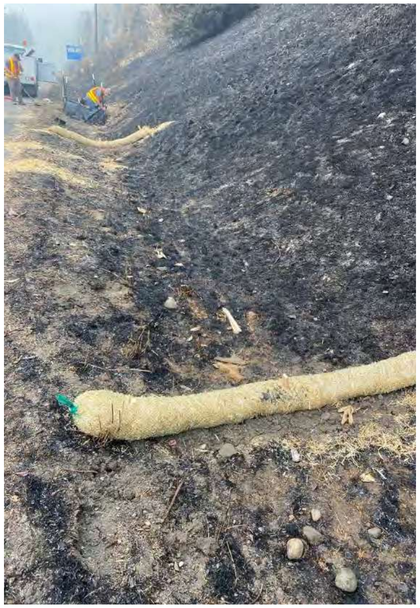


Photo 1. Erosion sock for sediment erosion control

Photo 2. Water well testing

Construction
- Air
- Noise abatement
- Erosion and sediment control measures
- Vegetation stripping minimized
- Wildlife

Operations
- Best available technology
- Noise attenuation measures on air cooled condensers and CO2 capture gas turbine
- Groundwater withdrawal will be monitored
- Stormwater pond
- Facility lighting

Potential Effects: Pipelines/Transmission Line

Construction
- Emissions
- Noise related to equipment
- Erosion
- Changes to soil structure
- Vegetation and wetlands
- Wildlife

Operations
- Sensory disturbance to wildlife use of habitat
- New habitat creation = increased potential for wildlife strikes on transmission towers/lines

Mitigations: Pipeline / Transmission Line

Construction

- Emission controls
- Noise abatement equipment as required
- Erosion and sediment control measures
- HDD entry/exit locations for rivers / streams
- Minimize vegetation stripping
- Wildlife protections include reducing flood lighting; restricting speed limits and vehicle movement on ROW etc.

Operations

- Install bird markers on overhead lines

Photo - bird marker

Historical and Cultural Considerations

The Project will consider Traditional Land Use, Physical and Cultural Heritage, and Historical, Archaeological and Paleontological Resources

Mitigation measures will be directed by Alberta Culture and Status of Women including activities such as:

- avoidance of impact through project redesign or alignment of pipelines and transmission towers
- field-based impact assessments (archaeology and/or paleontology)
- site-specific mitigation measures
- archaeological excavation
- documentation of historical structures

Indigenous Health, Social, and Economic Considerations

What is CCS?

26th June 2023

www.vault4401.com | info@vault4401.com

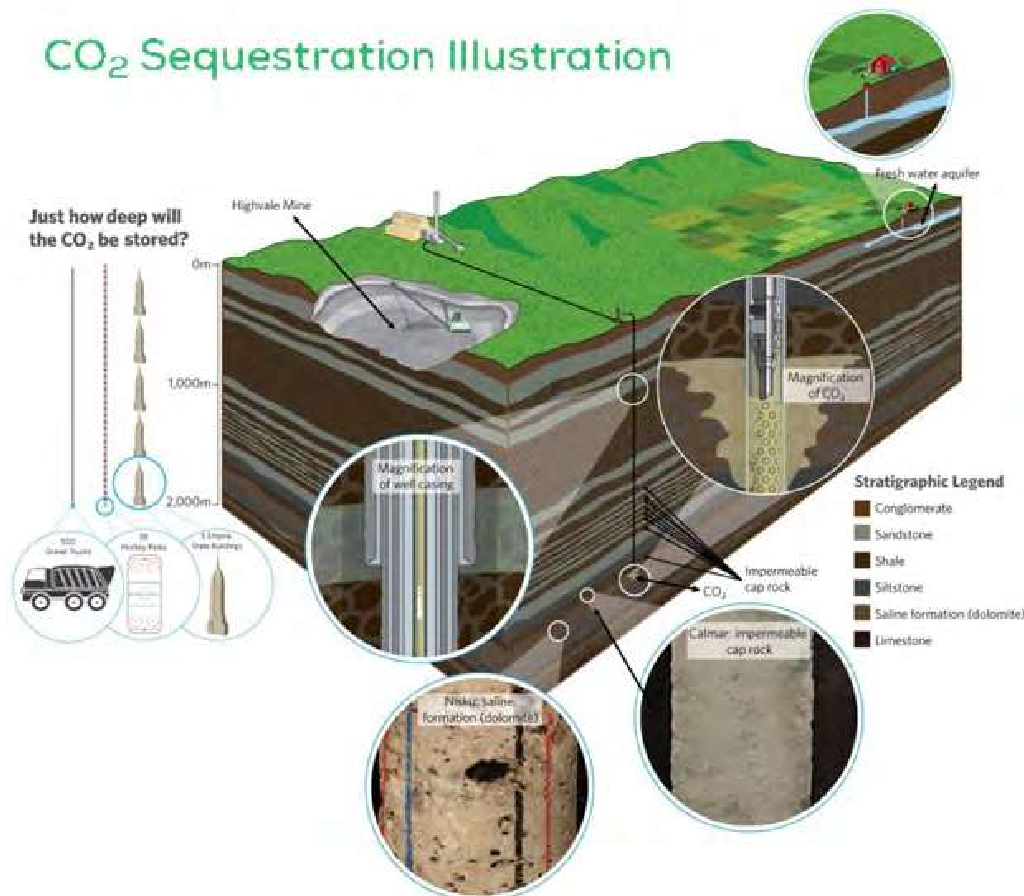
What Is CO₂ Capture and Sequestration?

Storage complex:

- Subsurface geologic storage system comprising a storage formation, primary, and potentially secondary seals

Target Formations:

- Project is targeting deep and laterally extensive saline aquifers



(Image courtesy of Project Pioneer, 2013)

Geology Primer

Key Properties for Consideration

Porosity: Saline water in the reservoir rock will be displaced by CO_2. Larger pore space (porosity) is more efficient for storage and reduces total acreage requirements.

Permeability: Level of connectivity between one pore space to another (permeability) impacts the injection rate or sealing capacity(ex. >20 md = good for storage, 0.0001md = good for seal)

Storage Formation:

- Medium-High Porosity (%)
- Medium-High Permeability (md)
- Thickness (~)

Confining Layer:

- Low Porosity (%)
- Low Permeability (md)

Deepest Potable Water:

- Salinity (ppm, %)

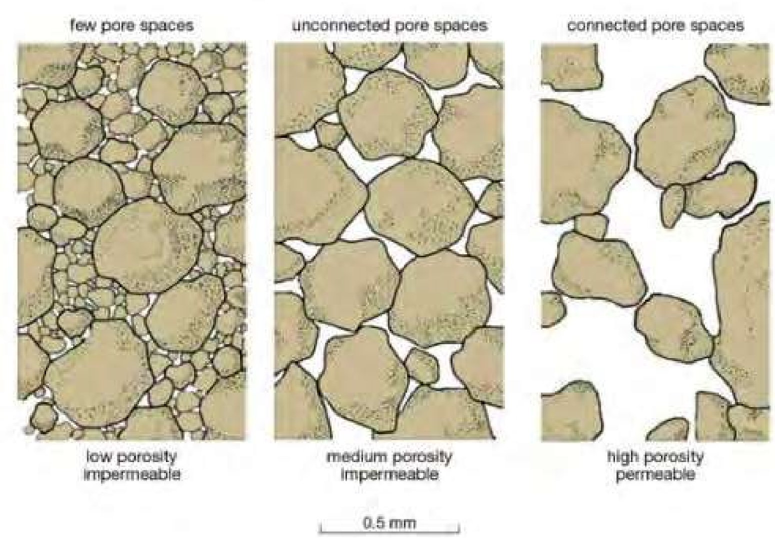
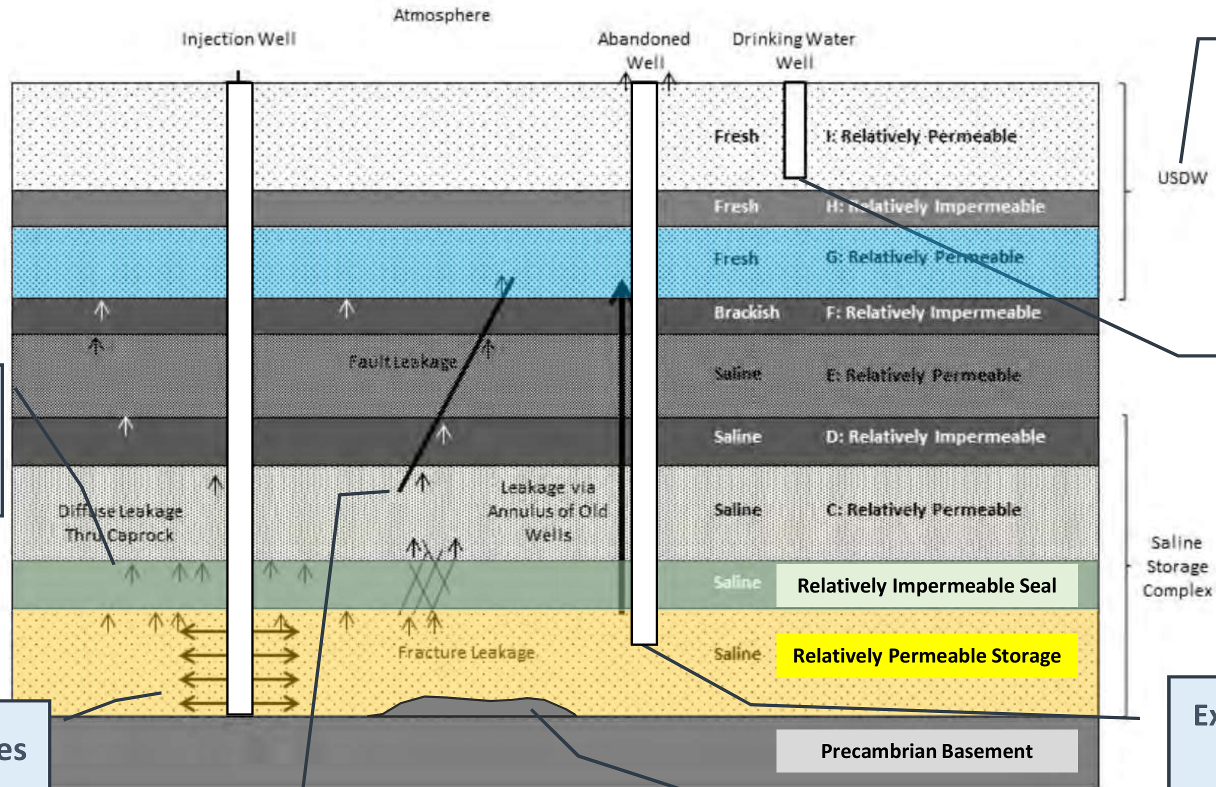


Photo source: (top) http://dmp.wa.gov.au/Petroleum/Introduction-to-unconventional-25621.aspx
(bottom)https://commons.wikimedia.org/wiki/File:Permeable_paver_demonstration.jpg

Objective of Technical Study

Evaluation of seal properties
(thickness, porosity, permeability, depth)

Evaluation of storage properties
(thickness, porosity, permeability)



Determine the deepest potable water

Identify all water wells in the area of review

Existing deep wells nearby that could be a conduit for CO_2?

Identify presence of faults / fractures

Identify presence of basement highs

Objective of Technical Evaluation

Evaluate the technical feasibility of a carbon storage project proximal to an emitter through:

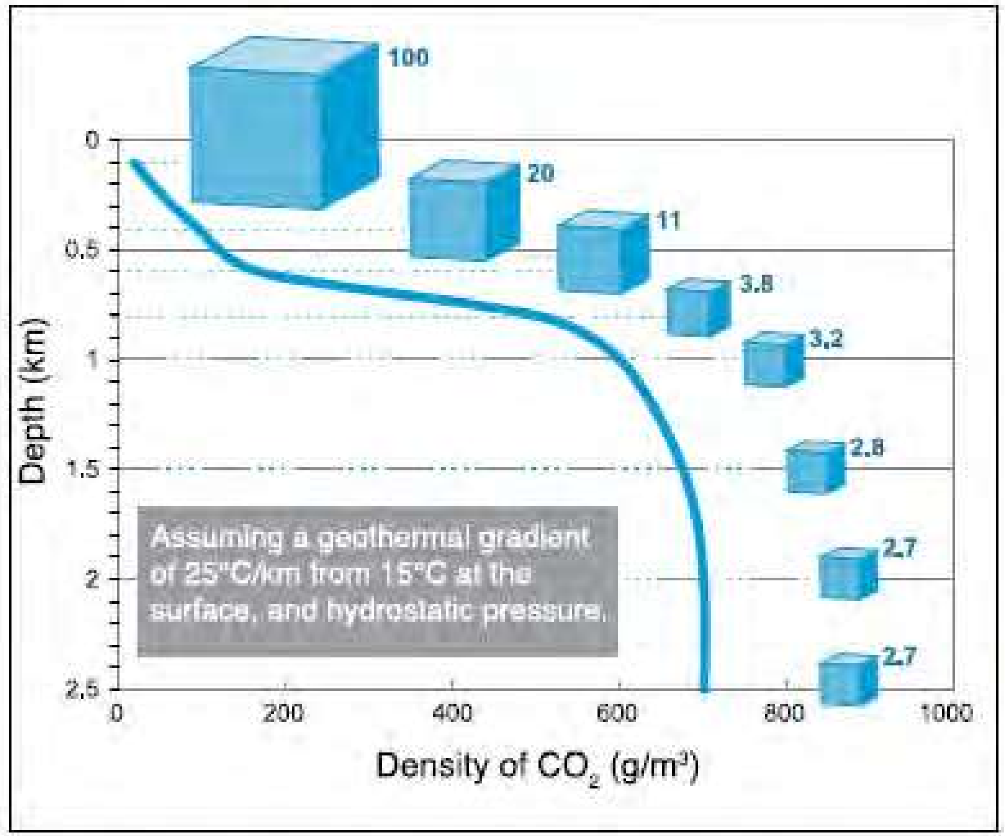
- Acquisition and interpretation of regional data
- Construction of a 3D model for an assessment of the geology underlying the facility
- Complete reservoir simulations to evaluate injectivity and storage capacity of reservoir

Property / Element	Relevance to Feasbility
Porosity	Capacity of injection & relationship to permeability
Permeability (storage and confining zone)	Seal quality to prevent upward migration; Injectivity of storage zone
Depth	Maintain super critical state of CO_2 Distance from potable water
Thickness (storage and confining zone)	Seal quality to prevent upward migration; Storage zone for capacity and injectivity
Seismic Activity	Seismic activity could be unfavorable for a storage project
CO_2 Phase Behavior Management	Maintain supercritical state for storage security and efficiency
Identify regional features that may impact feasibility	Presence of deep wells, water wells, faulting and fracturing, basement highs etc.

Phase Conditions for CO_2

Optimal Depth for Storage / Injectivity:

- Storage must occur at depths below 1000 m to maintain a supercritical state (>1,070 psi)
  - Dependent on reservoir pressure gradient
    - Under pressured (0.38 psi/ft): ~2,800 ft
    - Normally pressured (0.43 psi/ft): ~2,600 ft
- Gas phase carbon dioxide (CO_2) is inefficient and less secure
  - Decreased storage efficiency due to larger volumes (3% of volume when in supercritical state)
  - Decreased storage security due to increased mobility of gas vs liquid
- It can be a challenge to maintain supercritical state while staying under fracture pressure at shallow depths



(International Panel on Climate Change, 2005)

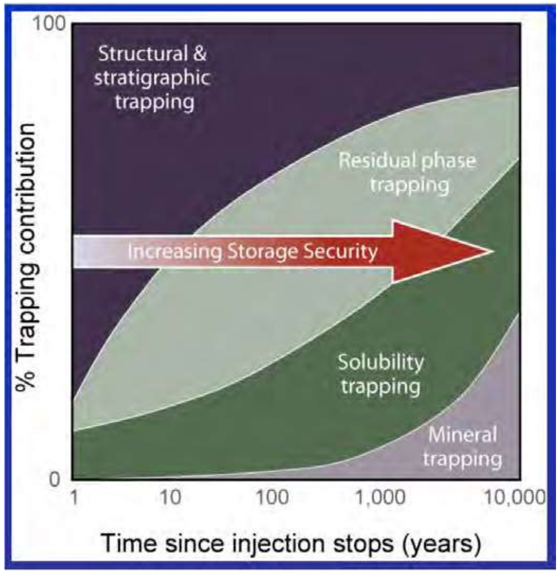
Trapping Mechanisms

Physical trapping

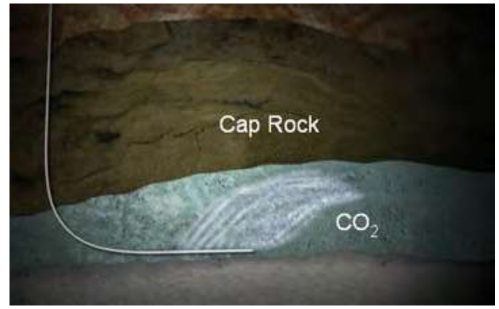
- Storage formation should be bounded by impermeable layers

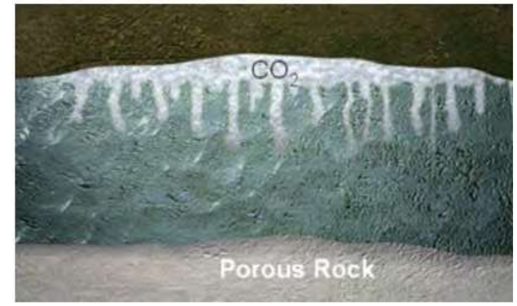
Solubility trapping

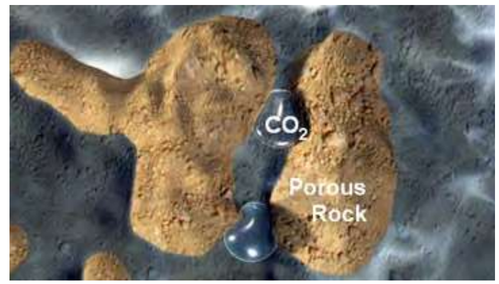
- CO_2 dissolves into the fluid phase



(Benson, 2005)







https://www.co2captureproject.org/co2_trapping.html

Residual phase trapping

- CO_2 trapped as a residual non-wetting phase

Mineral trapping

- CO_2 reacts with minerals in the formation to become part of the solid mineral matrix

CCS Regulatory Process in Alberta

Once granted a sequestration agreement, proponent may apply for evaluation permit prior to sequestration lease

Evaluation Permit (Mines and Minerals Act 115):

- Gives the operator a right to evaluate the geological and geophysical properties of a formation to determine its suitability for CCS for 5 years
- Single permit can be up to 73,728 ha
- Requires an MMV Plan and compliance with that plan
- Provide reports on compliance with the MMV Plan
- May not conduct any operations or activities at the site until the MMV Plan is approved

Carbon Sequestration Lease (Mines and Minerals Act 116):

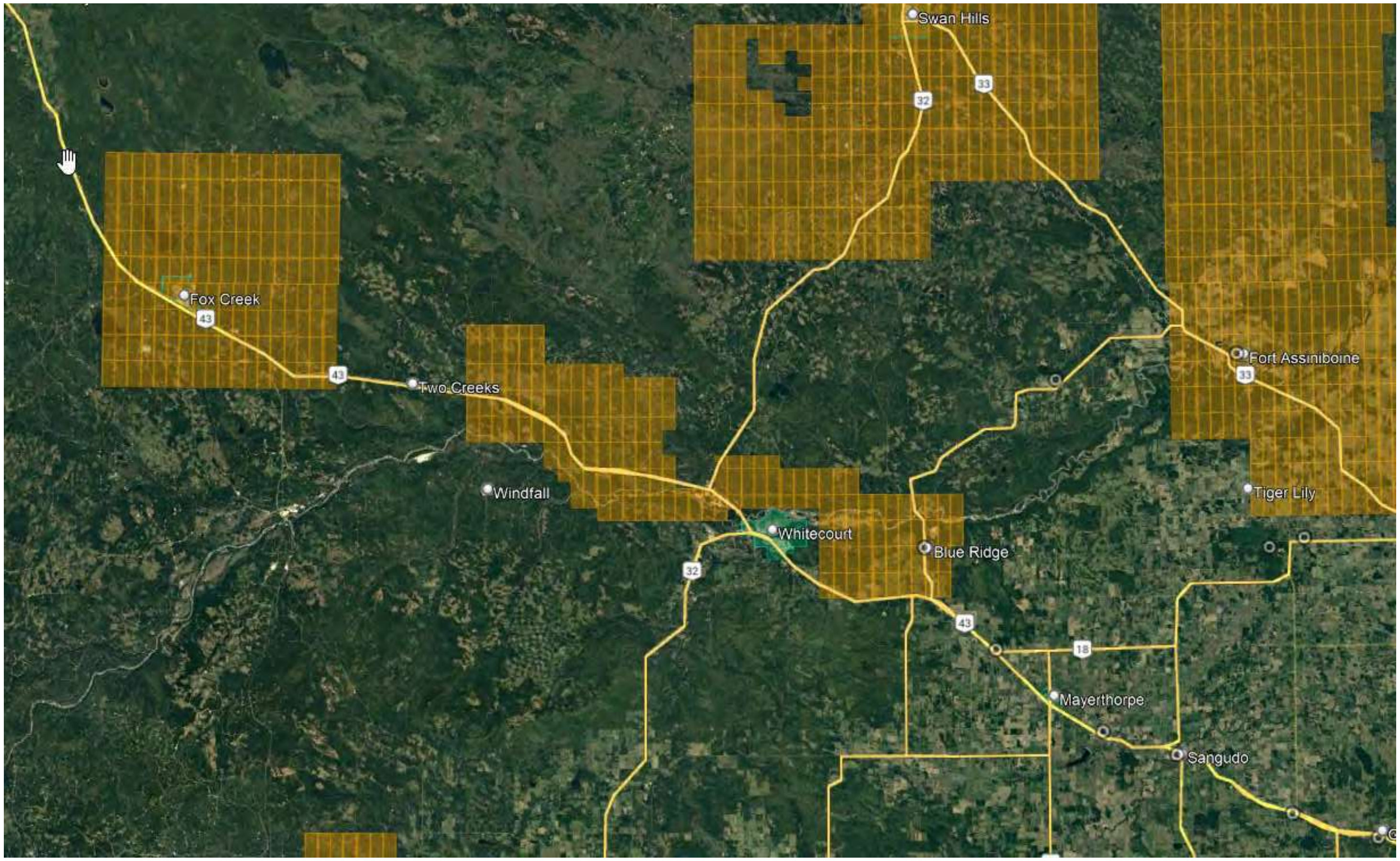
- Gives the operator a right to utilize the subsurface for CO_2 storage for 15 years (renewable)
- In addition to the evaluation well permit requirements:
  - Need to submit a Closure Plan and comply with it
  - Pay fees into the Post-closure Stewardship Fund

AER Directive 65 Permit:

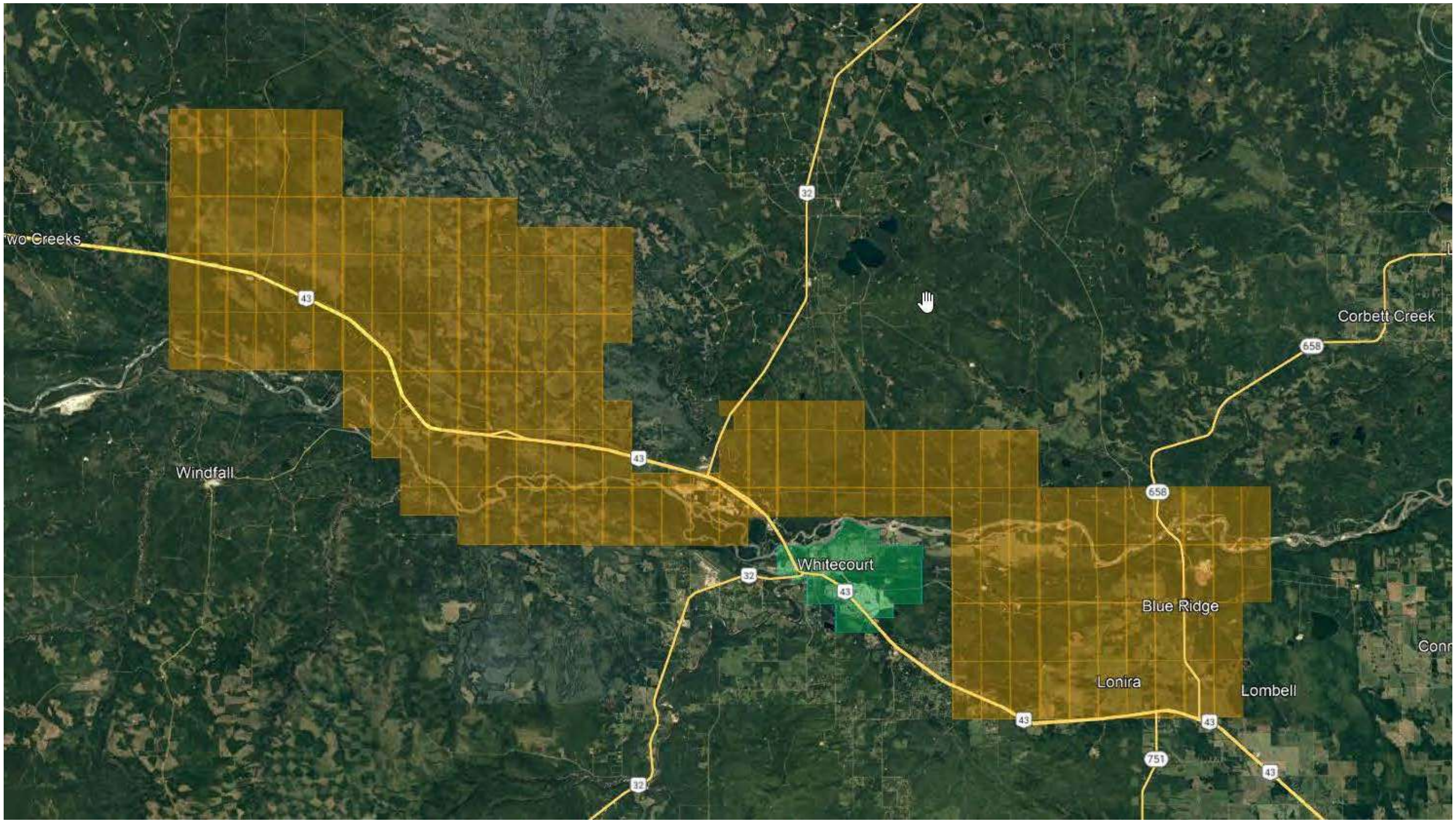
- Confers the right to inject CO_2
- Same permitting process as for water disposal, EOR, acid gas injection, etc.
- Expect 3-6 months to receive approval

To obtain a Closure Certificate and transfer project liability the project must demonstrate that the plume is behaving in a stable and predictable manner with no significant risk of future leakage

Proposed Regional Sequestration Hubs



Athabasca Banks – Area of Interest



MORAINE **POWER GENERATION** PROJECT

Meet the team!

Ankur Mathur
Project Lead

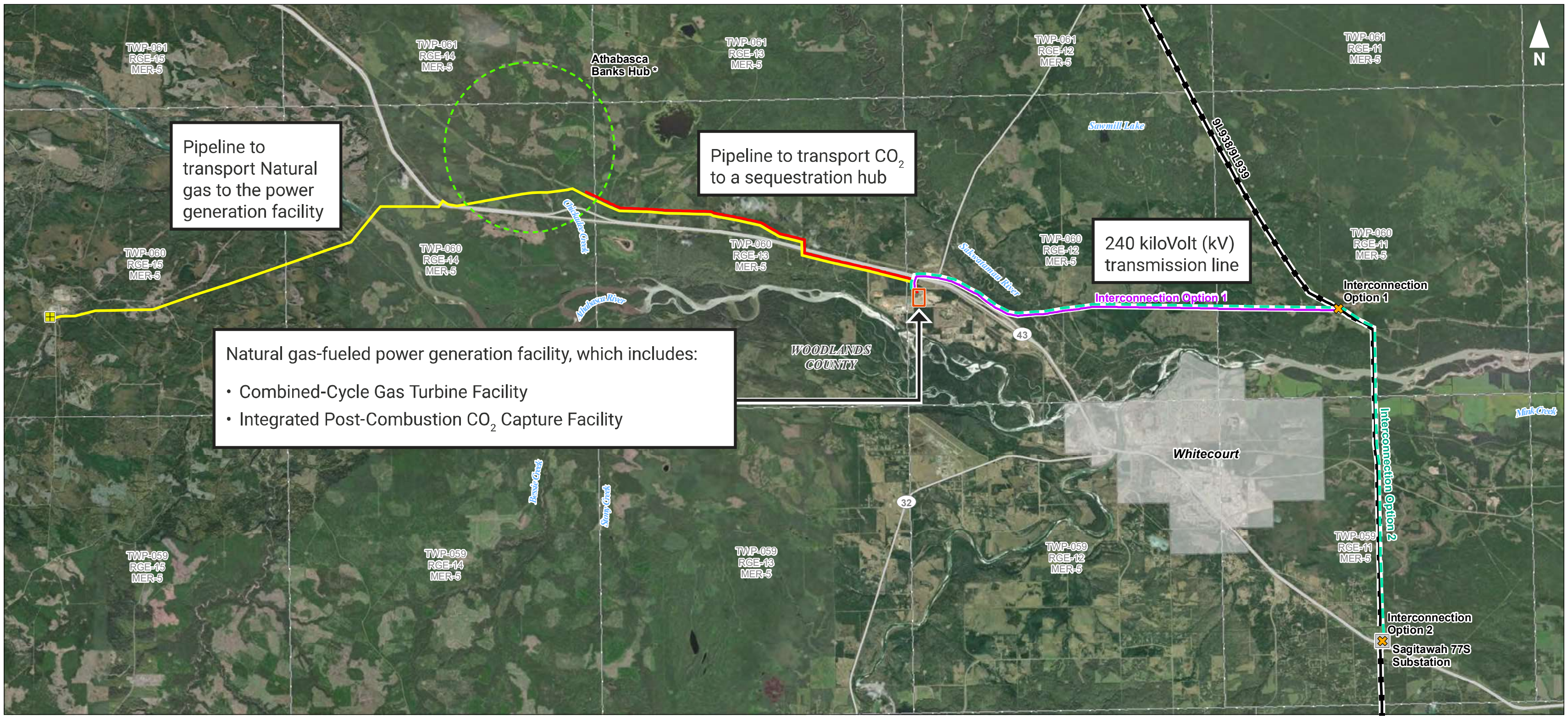
Roy S. Belden
Environmental Manager/
Counsel

Bridget Dougherty
Development Manager

John Nutter
Technical Manager

Moraine Power Generation Project owned by Moraine Initiatives Ltd. (Moraine), which is a wholly owned subsidiary of the General Electric Company.

MORAINE **POWER GENERATION** PROJECT



Legend

- Interconnection Site
- Existing Substation
- NGTL Windfall Meter Station
- Interconnection Option 1
- Interconnection Option 2
- Preferred CO_2 Pipeline Route
- Preferred Natural Gas Pipeline Route
- Athabasca Banks Hub
- Proposed Facility
- AESO 240 kV Transmission Line
- Township
- Urban Area

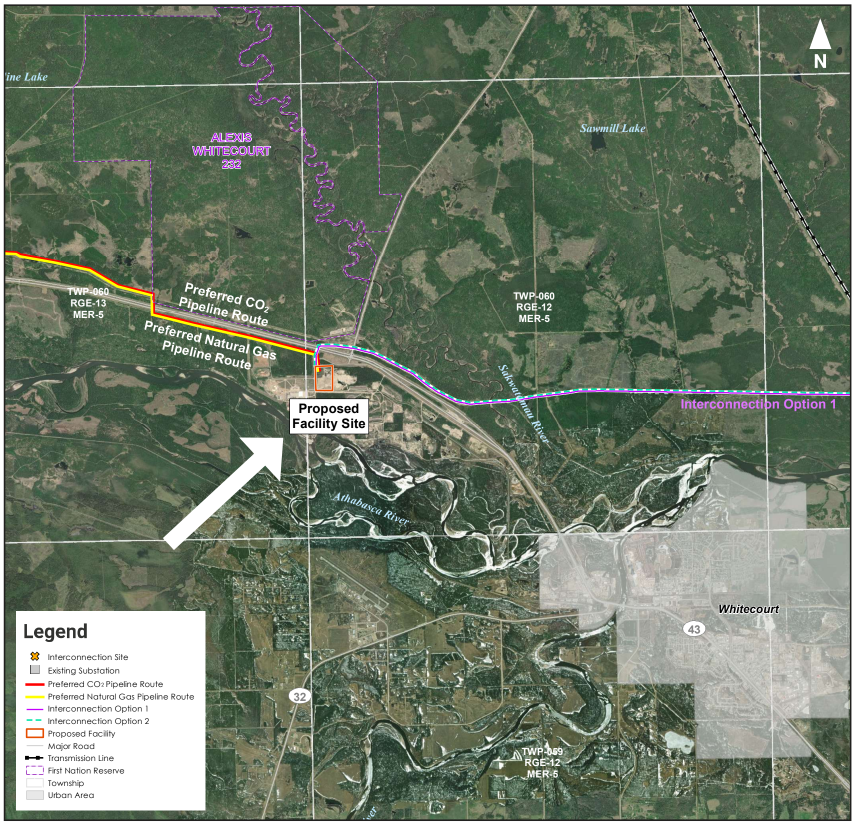
* - Connection Point(s) within Hub area to be determined

See the other boards for more information about the power generation facility and the pipelines.

The Project will supply reliable and affordable low-emitting generation electricity for Albertans by capturing CO_2 emissions.

- A state-of-the-art combined cycle power generation facility that will produce 465MW of electricity
- Compliant with Canada's proposed Clean Electricity Regulations
- Meet Canada's objectives of achieving net-zero emissions from the electricity grid by 2035
- The Project will be owned by Moraine and operated by an experienced third-party operator
- A staff of approximately 32 people including operators, engineers, and support staff will operate the facility once complete
- An estimated construction work force of 600-700 persons, over a 3-year period and construction workers are expected to be from the area

POWER GENERATION FACILITY **SITE**

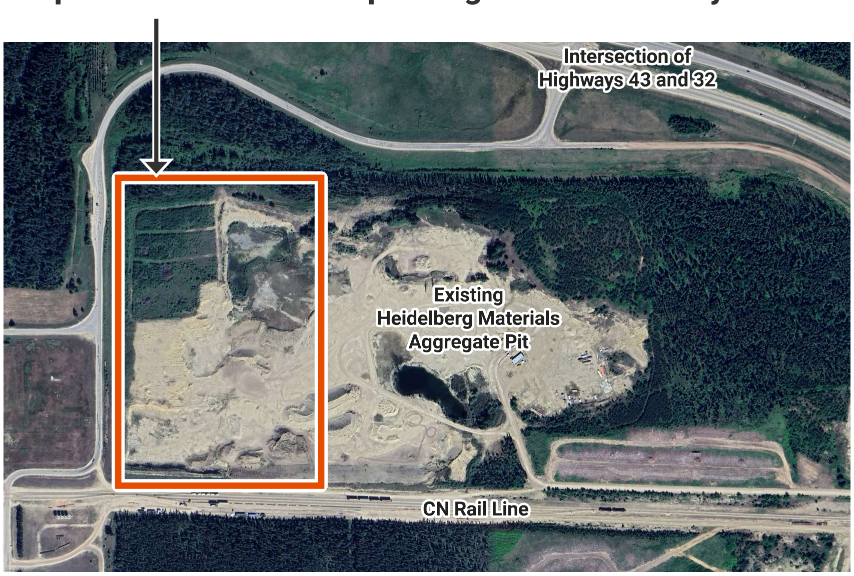


The power generation facility will house the combined cycle gas turbine and the Integrated Post-Combustion CO_2 Capture Facility.

The power generation facility is proposed to be constructed on Alberta Crown lands at a brownfield site. The location is southwest of the intersection of highways 43 and 32, just north of the Athabasca River in Woodlands County near Whitecourt, AB.

The site is currently under disposition to Heidelberg Materials and is being used to extract aggregate (gravel).

Proposed location of the power generation facility



APPLICABLE LEGISLATION

- *Impact Assessment Act*
- *Species At Risk Act*
- *Migratory Bird Convention Act*
- *Environmental Protection and Enhancement Act*
- *Alberta Utilities Commission Act / Hydro and Electric Energy Act*
- *Alberta Water Act*
- *Alberta Public Lands Act*
- *Alberta Municipal Government Act*

POWER GENERATION **FACILITY**

Project Components

Natural gas-fueled power generation facility, which includes:

Combined-cycle gas turbine facility (CCGT)

1) Gas turbine burns fuel:

The gas turbine compresses air and mixes it with fuel that is heated to a very high temperature. The hot air-fuel mixture moves through the gas turbine blades, making them spin.

The fast-spinning turbine drives a generator that converts a portion of the spinning energy into electricity.

2) Heat recovery system captures exhaust:

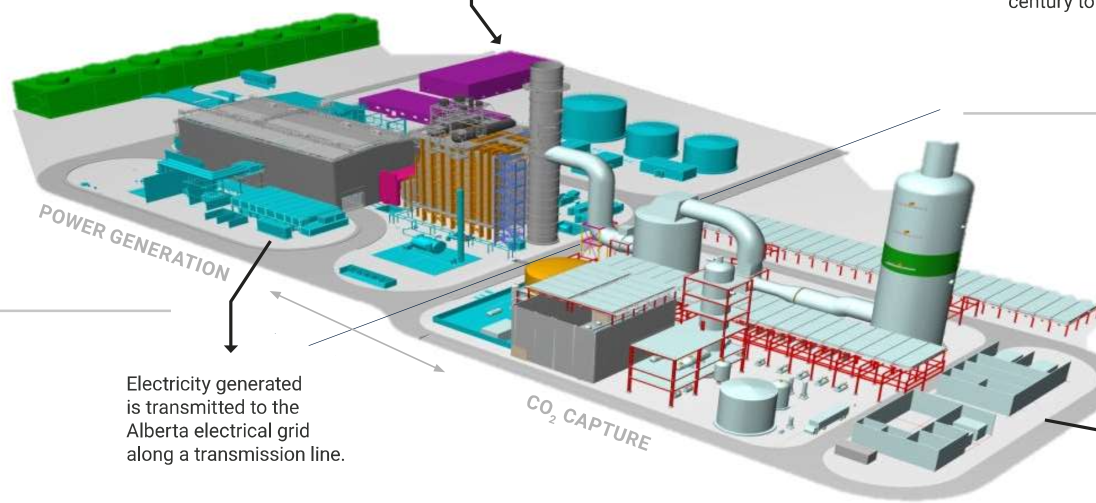
A heat recovery steam generator (HRSG) captures exhaust heat from the gas turbine that would otherwise escape through the exhaust stack.

The HRSG creates steam from the gas turbine exhaust heat and delivers it to the steam turbine.

3) Steam turbine delivers additional electricity:

The steam turbine sends its energy to the generator drive shaft, where it is converted into additional electricity.

How A Combined Cycle Power Plant Works | Gas Power Generation | GE Power



The Natural Gas Pipeline fuels the gas turbine.

Electricity generated is transmitted to the Alberta electrical grid along a transmission line.

Integrated post-combustion CO_2 capture facility (ICCF)

The integrated post-combustion CO_2 capture facility will remove up to 95% of the CO_2 contained in the exhaust gas using an amine CO_2 absorber.

This amine-based procedure has been widely used in Western Canada since the mid-20th century to process natural gas.

The captured CO_2 is transported by a pipeline to a sequestration hub.

Carbon Capture Solutions | GE Power

*Rendering not to scale; Power Generation Facility footprint is estimated to be ~40 acres or ~1/4 of a quarter section of land

TRANSMISSION LINE

Existing H-frame 240 kV transmission line in the area (foreground of photo)

APPLICABLE LEGISLATION

- *Species At Risk Act*
- *Migratory Bird Convention Act*
- Alberta Electric System Operator – Technical Requirements for Interconnecting Generators and Technical Requirements for Interconnecting Loads
- *Alberta Electric Utilities Act*
- *Alberta Public Lands Act*
- *Historical Resources Act*

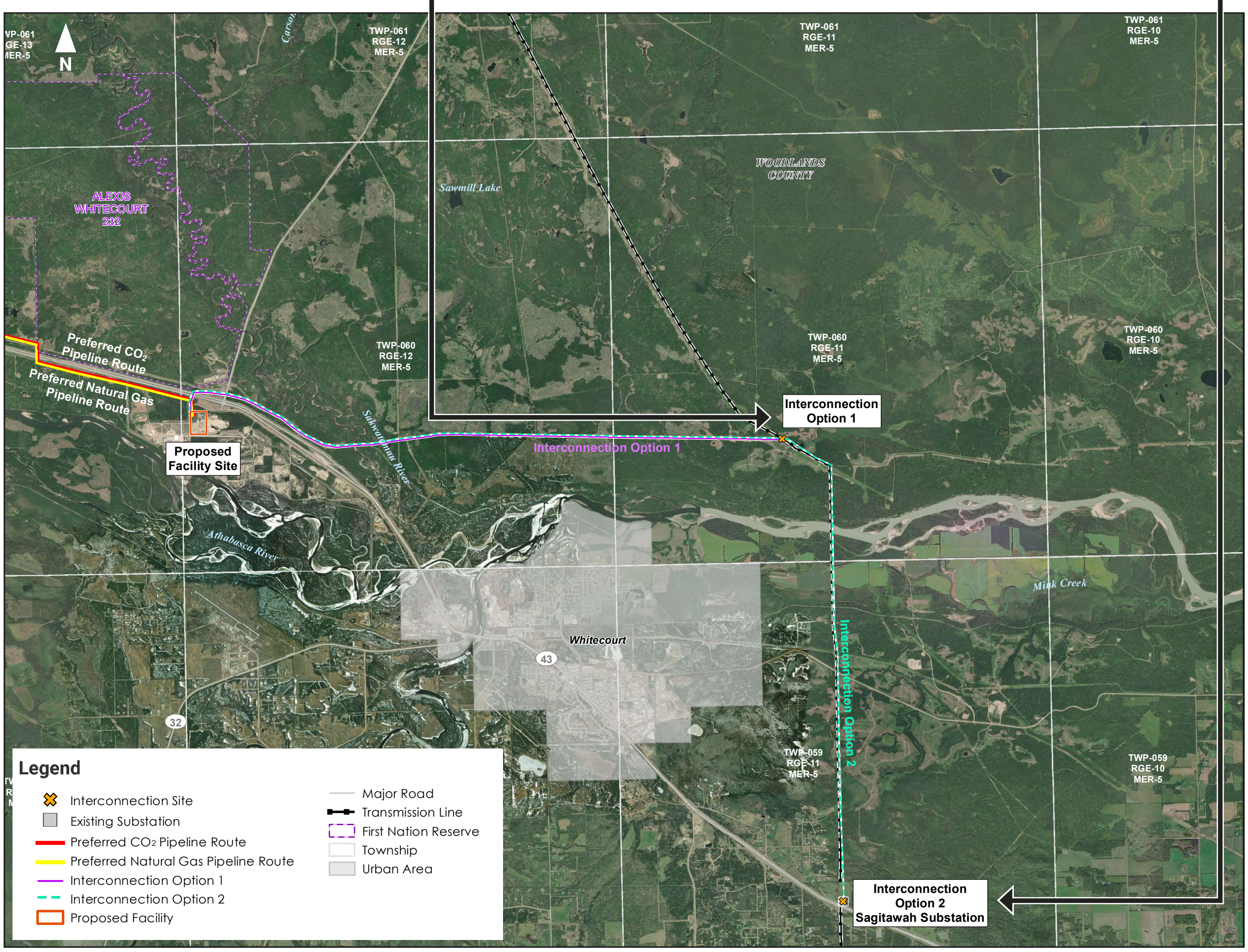
Electricity generated will be transmitted to the Alberta electrical grid along a new 240 kV transmission line.

Currently there are two proposed transmission line interconnection options:

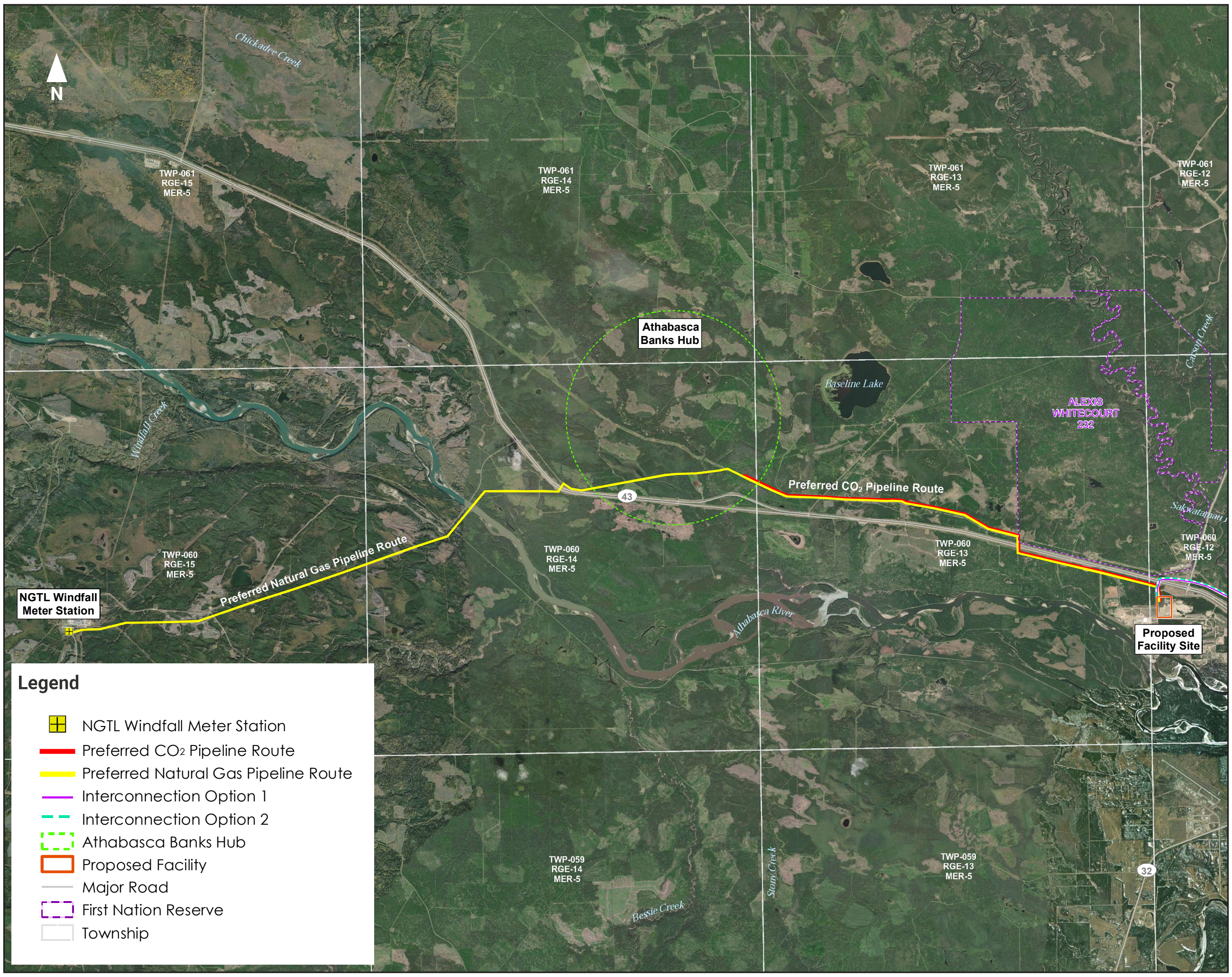
Option 1: Build 14 km of new transmission line in a new right-of-way and connect to an existing 240 kV transmission line.

Option 2: Build all of the new infrastructure for Option 1 + build an additional 10 km of line within or adjacent to the existing 240 kV transmission line right-of-way and connect to the Sagitawah Substation.

The grid operator will evaluate the options and make a decision to minimize technical and economic impacts to the grid.



PIPELINES



The power generation facility will be fueled by sweet natural gas.

A new 30 km (approximate) pipeline will transport the natural gas from the NGTL Windfall Meter Station to the power generation facility.

Preliminary pipeline outside diameters:

- Natural Gas Pipeline = 12 inches
- CO_2 Pipeline = 10 inches

The pipelines will be regulated by the Alberta Energy Regulator.


Right-of-way of an existing pipeline in the area

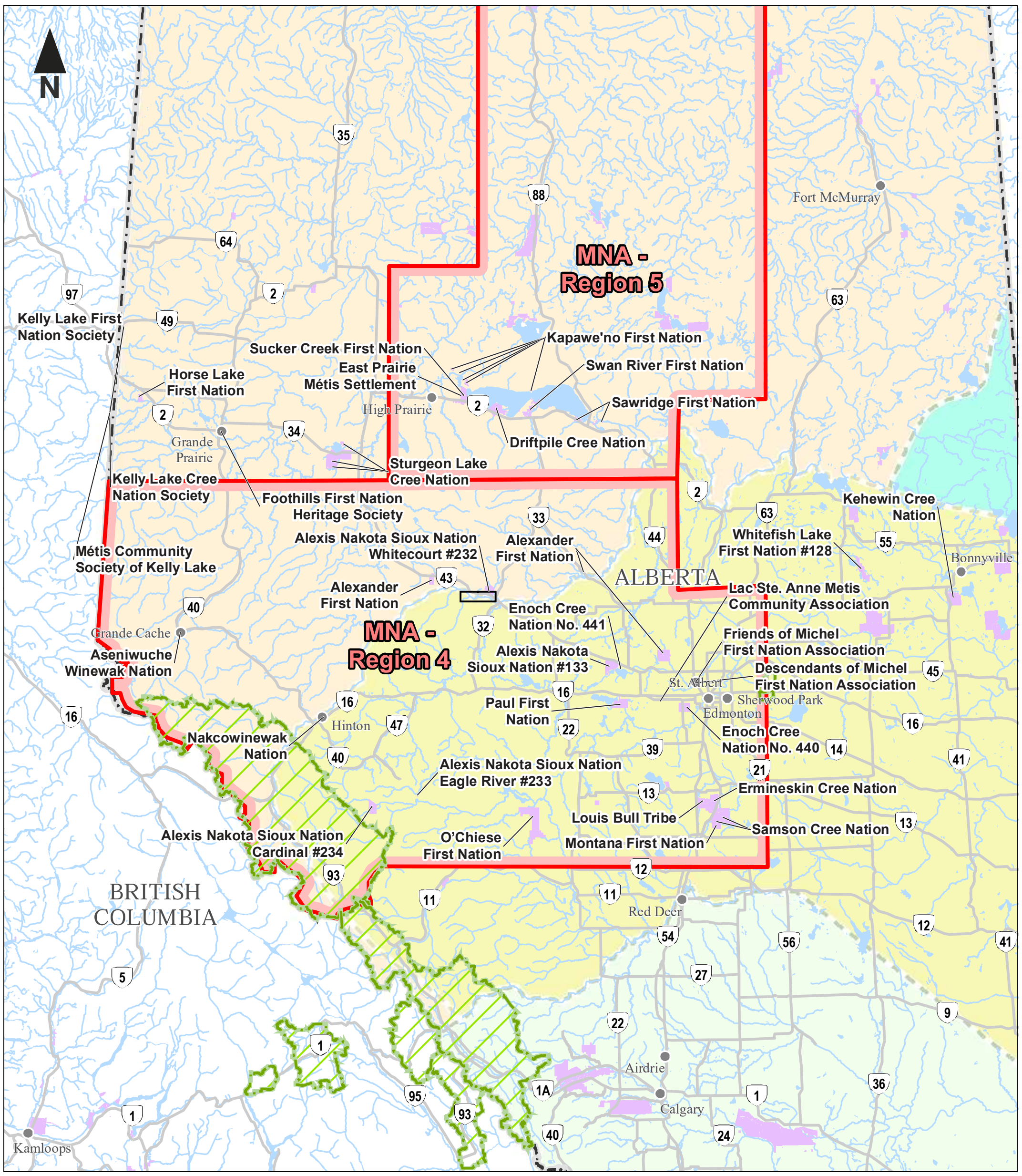
APPLICABLE LEGISLATION

- *Migratory Bird Convention Act*
- *Fisheries Act*
- *Species At Risk Act*
- *Pipelines Act*
- *Oil and Gas Conservation Act*
- *Alberta Public Lands Act*
- *Alberta Water Act*
- *Historical Resources Act*

ENGAGEMENT WITH
INDIGENOUS GROUPS

The Impact Assessment Agency of Canada directed Moraine Initiatives Ltd. to engage 28 Indigenous groups.

Moraine Initiatives Ltd. is committed to an engagement process that incorporates input from Indigenous groups to facilitate information sharing, two-way dialogue in order to understand perceived project impacts, incorporate mitigation measures, consider Indigenous knowledge, and advance reconciliation.



Legend

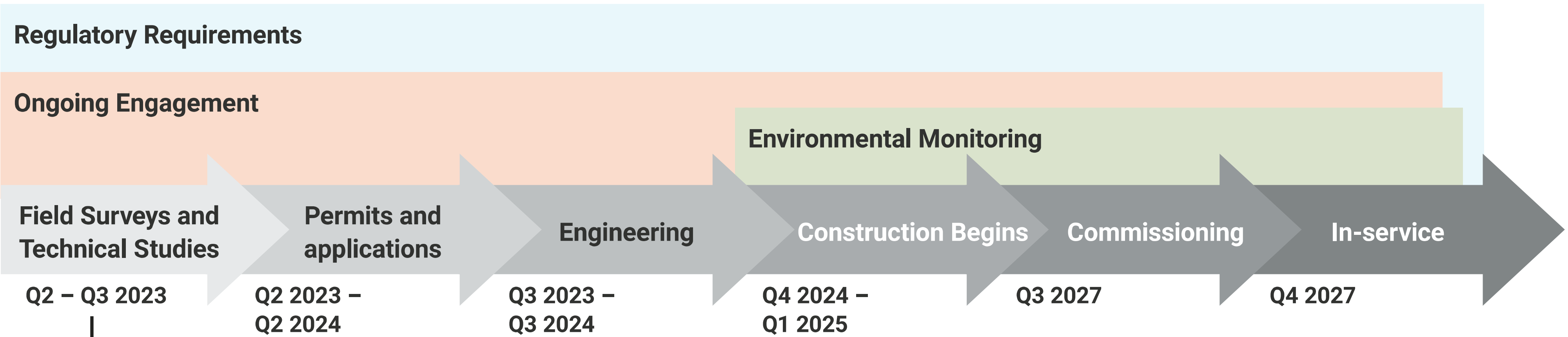
- Project Area
- First Nation Reserve
- Métis Nation of Alberta (MNA) Regional Zone

Treaty Boundary

- Treaty 10 (1906)
- Treaty 6 (1876)
- Treaty 7 (1877)
- Treaty 8 (1899)

- Populated Place
- Major Road
- National Park
- Provincial Boundary

PROJECT **SCHEDULE**



Field Surveys and Technical Studies include:

- Geotechnical investigation
- Vegetation surveys to assess:
  - Rare plants
  - Rare ecological communities
  - Introduction and spread of weeds
- Wildlife habitat assessments
- Aquatics field-based habitat assessment at Athabasca River and Chickadee Creek for pipeline crossings
- Soils surveys to assess topsoil depths and provide salvage recommendations

Construction Includes:

- Clearing vegetation
- Access road construction
- Surface preparations
- Foundation excavation, pilings, and underground piping
- Building construction including mechanical, electrical, and switchyard construction
- Installation of major equipment, pipelines, and transmission line
- Connection of process and ancillary equipment
- Site drainage and erosion control
- Site clean-up and restoration

REGULATORY **REQUIREMENTS**

Federal

Approvals / Permits

- Under the *Impact Assessment Act* – the Agency will review the Initial Project Description and Detailed Project Description to determine if an Approval by the Federal Government is required.
- The Department of Fisheries and Oceans will be requested to review any potential effects to fish and fish habitat from the Project (construction and operations) to determine if an authorization or permit is required under the *Fisheries Act*.

Provincial

Approvals / Permits

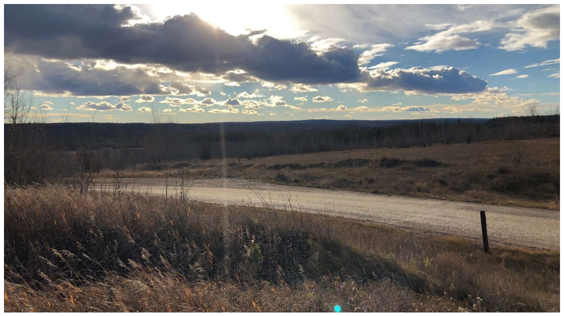
- An Industrial Approval under the *Environmental Protection and Enhancement Act* for the power generation facility will be required for construction and operations of the facility.
- The power generation facility and transmission line will be permitted by the Alberta Utilities Commission (Rule 007 and Rule 012).
- The natural gas pipeline and CO_2 pipeline will be approved through multiple Alberta Energy Regulator applications including: Conservation and Reclamation, Directives 065.
- *Water Act* approvals and licenses will be obtained for any water diversions, waterbody crossings or temporary disturbance to wetlands.
- Public Land dispositions will be obtained for the facility, pipelines, and transmission line to the extent they are located on Provincial crown land.
- *Historical Resource Act* approval will be obtained for all Project disturbance footprints, including completion of Historical Resources Impact Assessments to assess areas of high potential for resources.

Municipal

Approvals / Permits

- Woodlands County Municipal Development Plan Bylaw 406/13
- Woodlands County Land Use Bylaw 490/17
- Intermunicipal Development Plan for Woodlands County and the Town of Whitecourt Bylaw 401/12

PROJECT **CONSIDERATIONS**



Physical Environmental

The power generation facility will be situated on a brownfield site, where disturbance to the natural environment has already occurred. Pipelines and the transmission line for the Project are anticipated to be adjacent to existing rights-of-way.

Areas of focus for the Project include:

- Air Quality
- Noise
- Groundwater
- Soils
- Vegetation and Wetlands
- Wildlife and Wildlife Habitat
- Surface Water and Fish and Fish Habitat
- Historical Resources

Effects identified will be avoided, mitigated, or managed through approved methods, which may include:

- Ongoing monitoring
- Management plans
- Restricted activity periods and activities

Over 90% lower CO_2 emission intensity than other state of the art combined cycle power generation in Alberta

Historical and Cultural

The Project will consider Traditional Land Use, Physical and Cultural Heritage, and Historical, Archaeological and Paleontological Resources.

A Historic Resources Impact Assessment has been requested by Alberta Arts, Culture, and Status of Women (ACSW) for areas of high potential for archaeological, palaeontological and historical occurrences (e.g., near the Athabasca River, where pipeline crossings will occur).

Mitigation measures will be completed as directed by ACSW including activities such as:

- Avoidance of impact through project redesign or alignment of pipelines and transmission line
- Field-based impact assessments (archaeology and/or paleontology)
- Site-specific mitigation measures (e.g., controlled surface collection of cultural materials
- Archaeological excavation
- Documentation of historical structures activities

Indigenous Health, Social, and Economic

Indigenous Health Considerations

Potential effects on Indigenous health are being evaluated based on direct and indirect air quality effects and noise impacts from the construction and operation of the Project.

The Facility is directly adjacent to other industrial development and will be built on a brownfield site, currently used as natural resource extraction. The effects from equipment emissions and noise during construction are anticipated to be localized and not significant, which will limit the adverse effects on Indigenous peoples.

Indigenous Social and Economic Considerations

Socio-economic effects are anticipated to be positive for Indigenous groups due to opportunities for local employment during construction and operation of the Project.

Opportunities for socio-economic effects will be further evaluated based on engagement with Indigenous groups.

MORAINE INITIATIVES LIMITED
4000, 421 – 7 Avenue SW
Calgary, AB T2P 4K9

June 9, 2023

Subject: Invitation to Participate in a Meeting June 27, 2023, with Moraine Initiatives Limited

Hello,

As a follow up to the Information Package we sent you via email on May 19, 2023, on behalf of Moraine Initiatives Limited (Moraine), please accept this invitation to participate in an Indigenous Meeting regarding Moraine's proposed natural gas-fired power plant with integrated carbon capture capabilities (the "Project") in the vicinity of Whitecourt.

The Project is under review by the federal Impact Assessment Agency of Canada (IAAC) who have directed Moraine to engage with 28 Indigenous groups. All 28 Indigenous groups are being invited to meet the Moraine team, discuss the Project, visit the Project site, and if desirable, have an opportunity for a one-on-one meeting with the Moraine team.

The meeting will start with a welcome reception the evening of Monday, June 26, 2023 at the Eagle River Resort and Casino near Whitecourt, Alberta; and continue with presentations on Tuesday, June 27. The meeting will focus on the electricity generation and carbon capture aspects of the Moraine Power Generation Project, as well as the carbon sequestration process which is separate from the Project. We hope to provide ample opportunities to answer any questions you may have on the Project. On behalf of the Moraine team, we are interested in listening to your questions and comments to understand your perspective on the Project, and how it may affect your Indigenous and Treaty rights. The proposed agenda is attached for your review.

Site visits and one-on-one meetings will be scheduled in the afternoon of June 27 and the morning of June 28 based on your interest. Future meetings will be organized based on feedback from this meeting and the Project schedule.

We are able to accommodate two people from each Indigenous group and we look forward to hosting your Consultation staff, Elders, Knowledge Holders, or community members. Two people from each Indigenous group will be compensated for their time and travel based on the attached Reimbursement Schedule.

Please RSVP back to Zoe Rezac, our engagement consultant, at Zoe.Rezac@stantec.com by Friday, June 16, 2023, to advise of whether you or another community member will be attending the event and any dietary restrictions that we should be aware of. We are also interested in understanding your interest in a site visit and a one-on-one meeting. We look forward to meeting you at the end of June.

Respectfully,

<Signature removed>

Ankur Mathur, Vice President
Moraine Initiatives Limited

Attachment: Proposed Agenda and Reimbursement Schedule

cc. Zoe Rezac, Stantec
Roy Belden, Moraine Initiatives Limited
Bridget Dougherty, Moraine Initiatives Limited
Chelsea Fedrau, Impact Assessment Agency of Canada / Government of Canada
Stephanie Krysa, Impact Assessment Agency of Canada / Government of Canada

Agenda

Indigenous Meeting – Moraine Initiatives Limited Power Generation Project

Date: Monday, June 26, 2023 – Wednesday, June 28, 2023
Time: Set Forth Below
Location: Eagle River Casino & Travel Plaza, Whitecourt, AB
Room: Whistling Eagle

June 26, 2023

Time	Item	Purpose
6:00 – 8:00 pm	Welcome Reception	Meet the Project Team Schedule your one-on-one meeting Sign up for a site visit

June 27, 2023

Time	Item	Purpose
8:00 am	Breakfast	
9:00 am	Opening Prayer	
9:10 am	Welcoming Remarks	
9:15 am	Moraine Project Presentation and Q&A	Information Session
10:30 am	Break	
10:45 am	Carbon Sequestration Presentation and Q&A	Education Session
12:00 pm	Lunch	
1:00 – 4:00 pm	Activity Option 1 – Site Visit Activity Option 2 – One-on-One Meetings	Opportunity to see the power plant site Opportunity for consultation meetings with the Moraine team
4:00 pm	Round Table Discussion	Themes from the day
4:45 pm	Closing Remarks & Prayer	
5:00 pm	Supper	
6:00 – 9:00 pm	Optional One-on-One Meetings	Opportunity for consultation meetings the Moraine team

June 28, 2023

Time	Item	Purpose
8:00 – 9:00 am	Continental Breakfast and departures	
9:00 am – 12:00 pm	Optional One-on-One Meetings	Opportunity for meet the Moraine team in one-on-one meetings

Please note that a Public Open House will be held at the golf course in Whitecourt during the afternoon and evening of June 28, 2023. You are welcome to attend.

Reimbursement Schedule for Participants

All reimbursement will be paid by Stantec to the Indigenous group for distribution to the individual who attended the meeting. The eligible expenses for reimbursement are set out below. Stantec will provide the reimbursement forms for completion at the meeting and will provide assistance if needed. Indigenous groups may submit the completed reimbursement form along with receipts to Stantec for processing. Please note that it may take up to 8 weeks to process payments.

- Two community members per Indigenous group are welcome to attend.
  - We believe this may be of interest to your Consultation staff, Elders, Knowledge Holders, or community members
- Honoraria of $300/person attending
- Receipts will be required for reimbursement of actual meal expenses while traveling to and from Whitecourt. Travel Meals will be reimbursed up to a maximum of $50 per day for travel on Monday and Wednesday for a total of $100.
- Moraine is blocking and paying for rooms at a local hotel. We will need the names of those attending to confirm the rooms and Moraine will pay for them in advance. You will not be reimbursed for hotel rooms that you book and pay for on your own or for any incidentals.
- Mileage at $0.52/km will be compensated per vehicle.
- Reimbursement forms will be made available at the meeting.
- Lost receipt forms will be available upon request.

MORAINE INITIATIVES LIMITED
4000, 421 – 7 Avenue SW
Calgary, AB T2P 4K9

May 18, 2023

Reference: Moraine Power Generation Project near Whitecourt, AB

Moraine Initiatives Limited (Moraine) is pleased to provide information on our proposed natural gas-fired power generation facility with integrated carbon dioxide capture located in Woodlands County near Whitecourt, Alberta, AB (Project).

Moraine recently submitted an Initial Project Description (IPD) to the Impact Assessment Agency of Canada (IAAC) who are one of the federal regulators reviewing this Project. It is our understanding that you have received notification of the IPD from IAAC, or will receive this notification shortly. The attached information package is intended to complement (rather than replace) the IPD and is a high-level summary of the Project with fewer technical references.

As the Project advances, we will continue to reach out and provide you information, which may be associated with various regulatory permits and requirements and/or Project updates. Enclosed you will find an Information Package, which includes a map identifying general Project locations.

We are interested in meeting with you to discuss the Project. We request that you review the attached Information Package and contact our team with your questions and comments. Please contact Zoe Rezac, Moraine's engagement consultant with Stantec Consulting Ltd., at zoe.rezac@stantec.com or 780 917 8188.

Sincerely,

<Signature removed>

Ankur Mathur, Vice President
Moraine Initiatives Limited

cc: Zoe Rezac, Stantec
Roy Belden, Moraine Initiatives Limited
Bridget Dougherty, Moraine Initiatives Limited

Attachments:
Information Package

Moraine Initiatives Limited

Moraine Power Generation Project
near Whitecourt, AB

Project Information Package

May 18, 2023

Table of Contents

Acronyms / Abbreviations

AESO	Alberta Electric System Operator
AIES	Alberta Interconnected Electric System
AUC	Alberta Utilities Commission
CCGT	Combined-cycle gas turbine facility
CO_2	Carbon Dioxide
DCC	Direct Contact Cooler
DFO	Fisheries and Oceans Canada
ICCF	Integrated post-combustion CO_2 capture facility
kV	kiloVolt
LEG	Low-Emissions Generation of Electricity
PGF	Natural gas-fueled power generation facility
ROW	Right-of-way

1 Project Information Package

This Project Information Package provides information on a proposed natural gas-fired power generation facility (PGF) with integrated carbon dioxide (CO_2) capture located in Woodlands County near Whitecourt, Alberta (Project) that is being developed by Moraine Initiatives Limited (Moraine), which is a wholly owned subsidiary of the General Electric Company.

2 Project Purpose

The purpose of the Project is to supply reliable, affordable, and dispatchable low-emitting generation (LEG) to Albertans. By incorporating the capture of CO_2 emissions, the Project will produce near-zero emissions baseload electricity to meet the needs of Alberta electricity customers. The Project is planned to be compliant with Canada's proposed Clean Electricity Regulations and is aligned with – and a material step forward in Alberta toward – Canada's objectives of achieving net-zero emissions from the electricity grid by 2035.

3 Project Components

The Project consists of the following components:

1. Natural gas-fueled power generation facility (PGF), which is comprised of
    a. combined-cycle gas turbine facility (CCGT)
    b. integrated post-combustion CO_2 capture facility (ICCF)
2. 240 kilovolt (kV) transmission line interconnection between the PGF and existing Alberta electricity grid, the Alberta Interconnected Electric System (AIES)
3. CO_2 pipeline to convey CO_2 captured by the ICCF to the third-party Athabasca Banks CO_2 sequestration hub injection site
4. Natural gas pipeline connecting the PGF to the NOVA Gas Transmission Ltd. (NGTL) natural gas transmission network

The general location of project components is shown in Figure 1, titled Project Overview, and is attached in Appendix A.

4 Project Location

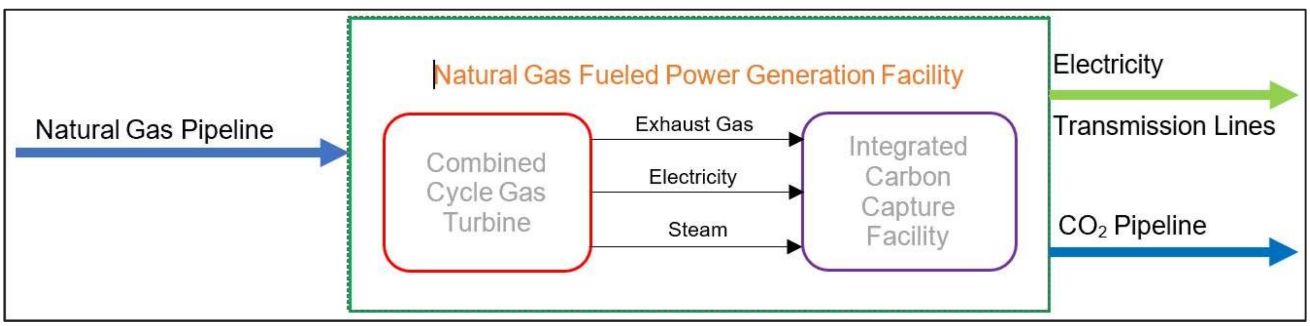
The natural gas-fueled power generation facility (PGF) is sited on 19 hectares of brownfield land located in Woodlands County approximately 10 kilometers to the northwest of Whitecourt, Alberta (AB). The ATS legal location is SW 18-60-12-W5M & NW 7-60-12-W5M; the GPS coordinates are 54.1819576376N, 115.796644173W. The site is on Alberta Crown land that is zoned as Natural Resources Extraction – Direct Control and is currently used as a gravel pit for aggregate extraction and processing.

5 Project Components

5.1 Natural Gas-Fueled Power Generation Facility (PGF)

The natural gas-fueled power generation facility (PGF) contains the combined cycle gas turbines (CCGT) and the integrated post-combustion CO_2 capture facility (ICCF). Figure 2, titled Preliminary Plant Rendering and attached in Appendix A, shows a preliminary rendering of the plant. Figure 3 below shows how the project components fit together.

Figure 3



5.1.1 COMBINED CYCLE GAS TURBINE (CCGT)

The combined-cycle gas turbine facility (CCGT) is a component of the power generation facility (PGF) and will use sweet natural gas to produce approximately 465 MW of electricity for delivery to the Alberta electrical grid, which is known as the Alberta Interconnected Electric System (AIES). “Combined cycle” means that the natural gas-fueled gas turbine generator is paired with a heat recovery steam generator to produce steam from the gas turbine exhaust heat, with a steam turbine generator producing additional electricity from this steam. The CCGT will have interconnecting water, steam, compressed air, and natural gas supply lines to operate the equipment. Natural gas will not be stored on site.

5.1.2 INTEGRATED CO_2 CAPTURE FACILITY (ICCF)

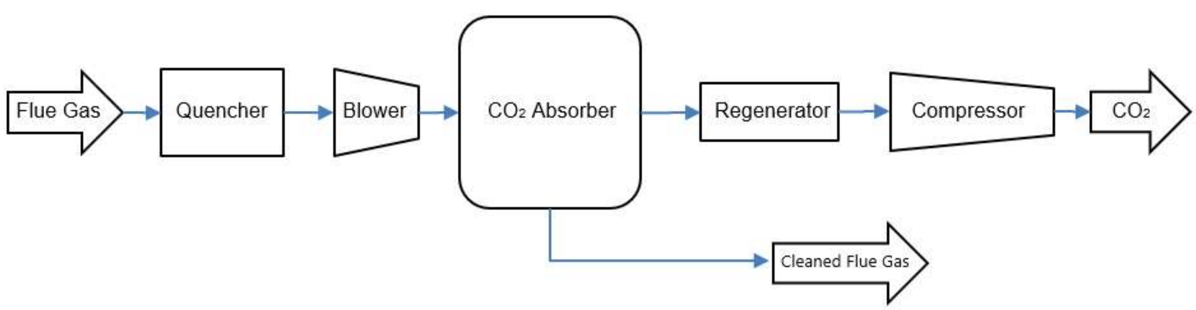
The integrated post-combustion CO_2 capture facility (ICCF) component of the power generation facility (PGF) will process the exhaust gas from the combined-cycle gas turbine facility (CCGT) and remove up to 95% of the CO_2 contained in this exhaust gas. There are several technologies capable of removing CO_2 from natural gas-fired power generation plant exhaust. However, among this range of technologies, only the amine-based regenerative liquid absorbent process has been technically and economically proven in commercial applications at a scale similar to, or larger than, that of the Project.

Amine-based CO_2 removal units have been widely used in Western Canada in the processing of natural gas since the mid-20th century. Thus, there are several decades worth of design, construction and operating experience across many dozens of amine-based gas processing units in Western Canada. The amine process to be used in the ICCF is very similar to that of these natural gas treating plants operating in Alberta today.

The ICCF contains five important pieces of equipment that are described below and illustrated in Figure 4:

- A Quencher (also called a Direct Contact Cooler or DCC) to reduce gas turbine exhaust temperature entering the process.
- A Blower (or Induced Draft Booster Fan) to ensure the gas turbine exhaust continues moving through the CO_2 capture process.
- An amine-based CO_2 Absorber that removes most of the carbon dioxide from the gas turbine exhaust stream by absorbing it into an amine solution. Treated gas turbine exhaust with greatly reduced CO_2 content is directed back to its exhaust path to atmosphere from this component step.
- The CO_2 -loaded amine ("rich amine") moves into the Regenerator where CO_2 is boiled out of the amine using heat from a steam source. Regenerated amine is then cooled and cycled back to the absorber to capture more CO_2.
- Finally, the captured CO_2 is directed into a Compressor to pressurize and dehydrate the CO_2 gas for the power generation facility (PGF) CO_2 export pipeline requirements. The CO_2 is then transported by pipeline away from the PGF toward its approved sequestration point.

Figure 4 Amine-based ICCF



All of the Project components are located within Woodlands County in Alberta. The layout of the equipment in the PGF is shown in Figure 5, titled General Layout of the Moraine Power Plant, and included in Appendix A.

5.2 Transmission Lines

Electricity generated by the combined-cycle gas turbine (CCGT) will be transmitted to the Alberta electrical grid (AIES) along a new 240 kV transmission line. Two interconnection options have been proposed by the Alberta Electric System Operator (AESO) and are currently undergoing technical studies. These are indicated on the Project Overview Figure 1 included in Appendix A. Both options require 10 km of new transmission line right-of-way (ROW) adjacent to the ROW of an existing 240 kV transmission line but have different interconnection options thereafter.

Interconnection Option 1 proposes constructing a single new 240 kV circuit of about 10 km length paralleling existing 240 kV circuit 907L to tie into existing transmission line 9L938 (between the Sagitawah 77S switchyard and the Louise Creek 809S switchyard) with a T-tap configuration.

Interconnection Option 2 constructing a single new 240 kV circuit of about 20 km total length to the Sagitawah 77S switchyard. The first 10 km of this new circuit is identical in routing to Interconnection Option 1 (i.e., parallel to existing 907L). Rather than tying into transmission line 9L938, the new line is proposed to be strung on the existing open side of the tower structures of 9L938 for the remaining 10 kilometers and tie in at the switchyard instead. This option would include upgrading the Sagitawah 77S switchyard by adding one new 240 kV circuit connection and adding or modifying equipment as necessary.

5.3 CO_2 Pipeline

A pipeline will be needed to transport the CO_2 from the power generation facility (PGF) to a third-party CO_2 sequestration hub northwest of Whitecourt. The CO_2 sequestration hub is not part of the Project. The pipeline route being considered parallels existing disturbances where possible, including existing natural gas pipeline rights-of-way and Highway 43. The CO_2 pipeline will be approximately 12 km in length and will be regulated by the Alberta Energy Regulator (AER).

5.4 Natural Gas Pipeline

The power generation facility (PGF) will be fueled by sweet natural gas. It is anticipated the natural gas will be sourced from the existing Nova Gas Transmission Ltd. system at the Windfall Meter Station. A pipeline, approximately 30 km in length, will be built to transport the natural gas from the Windfall Meter Station to the PGF. The pipeline route is in development; however, a likely route parallels existing disturbance for the majority of the route including existing natural gas pipeline rights-of-way. The preferred route is shown in Figure 1, titled Project Overview, and is attached in Appendix A. The pipeline will be regulated by AER and deliver approximately 85,000 GJ/d of sweet natural gas.

6 Construction Timelines and Anticipated Activities

Subject to receipt of regulatory and other approvals, construction of the Project is anticipated to start Q3 2024, with the Project planned to enter commercial service in Q3 2027. The table below describes the project schedule and anticipated construction activities for the Project.

Date	Anticipated Activities
Q2 and Q3 2023	Field Surveys and Technical Studies • Geo-technical investigation • Environmental reviews including: - Vegetation surveys to assess rare plants, rare ecological communities, or from the introduction and spread of weeds - Wildlife habitat assessments - Aquatics field-based habitat assessment at Athabasca River and Chickadee Creek - Soils surveys to assess topsoil depths and provide salvage recommendations
Q2 2023 thru Q2 2024	Permits and approval applications
Q3 2023- Q3 2024	Preliminary engineering
Q4 2024 start	Construction including: • Clearing vegetation • Access road construction • Surface preparations • Foundation excavation, pilings, and underground piping • Building construction including mechanical, electrical, and switchyard construction • Installation of major equipment • Connection of process and ancillary equipment • Site drainage and erosion control • Site clean-up and restoration
Q3 2027	Startup / commissioning
Q4 2027	In service
> 2068	Project decommissioning (after estimated 40-year life)

7 Regulatory Requirements

The Project is subject to federal, provincial, and municipal regulatory requirements:

Federal Acts:

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

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

- *Hydro and Electric Energy Act*
- *Electric Utilities Act*

- *Environmental Protection and Enhancement Act*
- *Water Act*
- *Historical Resources Act*
- *Public Lands Act*
- *Pipeline Act*

Regulatory requirements from the Woodlands County and Town of Whitecourt that may affect the Project:

- Woodlands County Municipal Development Plan Bylaw #406/13
- Woodlands County Land Use Bylaw 490/17
- Intermunicipal Development Plan for Woodlands County and the Town of Whitecourt Bylaw 401/12

8 Project Operations

The Project will be owned by Moraine and operated by an experienced third-party operator. Day to day operation and maintenance will be provided by a staff of operators, engineers, and support staff totaling approximately 32 persons.

The turbine and generator manufacturer will provide major maintenance and inspection work.

The Project will generally operate as a baseload facility, i.e., normally always operating at or near full capacity, subject to outages and planned shutdowns.

Natural gas will be delivered to the power generation facility (PGF) site by a pipeline and combusted in the combined-cycle gas turbine (CCGT) to generate electricity. The exhaust gases from the CCGT are processed in the integrated post-combustion CO_2 capture facility (ICCF) to remove up to 95% of the CO_2 from this CCGT exhaust stream.

CO_2 captured in the ICCF will be transported through a CO_2 pipeline to a third-party CO_2 sequestration hub.

The electricity generated will be supplied to the Alberta electrical grid (AIES).

8.1 Water Supply, Wastewater Disposal, and Stormwater Management

The power generation facility (PGF) will principally use aerial cooling for its process cooling needs, which greatly reduces water demands compared to similar projects that use water for cooling. Nonetheless, the PGF has a need for modest volumes of freshwater for uses such as boiler feedwater treatment makeup. It is planned to meet this water demand by constructing and operating a new groundwater supply system as part of the Project.

The PGF process wastewater discharges will be temporarily stored on-site and disposed of in deep geological formations via disposal wells.

Stormwater that falls on the PGF site will be collected in a stormwater retention pond. This stormwater will be released to the environment once monitoring confirms that it meets quality requirements to be released. Any contaminated stormwater will be disposed of via approved disposal facilities.

9 Potential Effects from Project

The Project considered the potential effects it may have on the environment during construction and operations. Consideration was given to:

- Air Quality
- Acoustic Environment (Noise Emissions)
- Groundwater
- Soils
- Vegetation and Wetlands
- Surface Water and Fish and Fish Habitat
- Wildlife and Wildlife Habitat including Species at Risk and Migratory Birds

9.1 Air Quality

Air emissions during the construction phase may result from construction equipment exhaust and from dust associated with construction activities. During operations, emissions will result from the combustion of natural gas in the production of electricity.

Mitigation measures during construction will be put in place to minimize emissions such as:

- Vehicles and equipment will be required to meet emission control standards
- Diesel fuel will have sulphur limits
- Construction vehicle idling times will be reduced to the extent possible to reduce emissions
- watering roads during construction activities.
- Disturbed surfaces will be revegetated promptly following construction to prevent wind erosion and to control dust.
- Surfaces of temporary soil and overburden stockpiles will be stabilized during extended periods between usage, by means of vegetating or covering the exposed surfaces.
- Silt fences and other erosion control methods such as mulching and application of tackifiers will be used to prevent soil loss from soil stockpiles due to wind erosion.

Mitigation measures during operations will include:

- The power generation facility (PGF) will include advanced pollution control technologies to minimize emissions.

9.2 Acoustic Environment (Noise Emissions)

Noise emissions during the construction phase will arise from construction equipment and vehicles. During operations there will be noise emissions from the operation of the power generation facility (PGF). A noise impact assessment will be completed for the Project as per Alberta Utilities Commission (AUC) Rule 12.

Mitigation measures during construction will include:

- Construction activities will be limited to the daytime period.
- Noise abatement equipment on vehicles and machinery will be maintained in good working order.
- Minimize vehicle and equipment idling.
- Residents near to construction noise-generating activities will be notified prior to construction.
- A complaint response procedure will be implemented to address noise complaints should they arise.

Mitigation measures during operation will include:

- Enclosers will be used on equipment to reduce noise emissions.
- Noise reduction features will be used on Project equipment.
- Noise attenuation measures on air cooled condensers and/or air-cooled heat exchangers will be included in design.

9.3 Groundwater

During construction of the power generation facility (PGF), pipelines, and transmission line, the Project has the potential to change groundwater quantity and quality as a result of drilling of extraction wells, excavation and potential dewatering activities, and from accidental spills in areas where groundwater is shallow.

During operation, the Project has the potential to result in a change to groundwater quantity as water supply for the operation could include a groundwater diversion for operations and as the source for process water. A change in groundwater quality could also occur because of accidental spills during operation, although the effects of accidental spills is expected to be limited based on the planned design and operation of the Project. Further analysis and characterization of the shallow groundwater near the PGF site are planned in the next phase of the Project.

Mitigation measures during construction include:

- Monitor water levels in all open excavations.
- Limit the amount of time that a trench is left open.
- Discharge water away from drainage courses, water bodies and wetlands; appropriate locations for discharge will be identified during construction by a qualified environmental monitor.
- Monitor the water discharge site for signs of erosion, saturation of the discharge site or flow off of the approved release area. Suspend dewatering and apply erosion control measures, reduce the flow or move the discharge site if it appears that the above effects are occurring.

- In the event that contaminated, or potentially contaminated soil or water is encountered, implement contamination management and contingency plans.
- Develop and implement procedures to manage the risk of spills.
- In the event of a spill, efforts to contain, remove or remediate any contaminant(s) causing environmental effects shall be completed.
- 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.

Mitigation measures during operations include:

- Monitoring of the groundwater network both for potential contaminants related to operation of the PGF and to limiting the groundwater withdrawal to the calculated rate for consumption.

9.4 Soils

During construction of the pipelines, soil will be stripped and stockpiled in rows along the ROWs. For the transmission line, soil disturbance will be limited to areas where there are towers, or other infrastructure. These soils will be stockpiled for reclamation.

Following completion of power generation facility (PGF), pipeline and transmission line construction and post-construction reclamation of the pipeline and transmission line ROWs, no effects on soil are anticipated.

Mitigation measures during construction include best management practices for handling soil during construction projects.

Mitigation measures during operations are not expected to be required.

9.5 Vegetation and Wetlands

Limited effects on native vegetation and wetlands associated with construction of the power generation facility (PGF) are anticipated as the majority of the PGF site has been stripped during previous aggregate quarrying and only a small patch of native vegetation remains. During construction of the pipelines and transmission line, natural vegetation will be cleared, and wetlands may be temporarily disturbed.

Following completion of PGF, pipeline and transmission line construction and post-construction reclamation of the pipeline and transmission line ROWs, no new operations phase effects on native vegetation and wetlands are anticipated.

Mitigation measures during construction include:

- Activities will be restricted to the Project footprint to minimize vegetation loss.
- Do not allow clearing or grubbing beyond the marked construction temporary workspace boundaries.
- Where grading is not necessary, implement minimum surface disturbance techniques to assist in maintaining an intact ground surface.
- Limit clearing of trees at watercourse crossings to the area required to complete the construction.

- Where practical, leave stumps in place, particularly on streambanks, to provide surface stability.
- Salvage merchantable timber according to the requirements of the forest management agreement holder.
- Reclaim disturbed areas according to requirements of the provincial land manager. This may include natural revegetation, seeding and/or shrub staking.

Mitigation measures during operations are not expected to be required.

9.6 Surface Water and Fish and Fish Habitat

Based on the location, construction of the power generation facility (PGF) is not expected to affect surface water, fish, or fish habitat. Construction of all pipeline and transmission line across the Athabasca River and its tributaries will be assessed for fish and fish habitat, prior to finalizing crossing methods and to identify potential effects and appropriate mitigation.

Construction of pipelines and transmission lines could increase sediment in surface water and affect flow patterns, habitat structure, bank stability, and temporary loss of riparian habitat. Fish mortality is also a risk.

During Project operations, there are no anticipated effects to surface water, fish, and fish habitat based on water use. Process water from the operation of the PGF will be contained in a closed loop system and stored in appropriate tankage on site prior to disposal to an approved location. Therefore, no interactions with surface water or fish and fish habitat will occur.

The stormwater pond will be designed to collect surface water runoff from the PGF and will have appropriate liners for the retention of liquids or compacted material to retain water and prevent leaching of water into soil, groundwater, or unmitigated flow offsite.

Mitigation measures during construction include:

- Develop and implement an erosion and sediment control plan that reduces the risks of sedimentation into crossed watercourses during construction.
- Spill containment kits must be present on site in designated locations where risk of spill is deemed the greatest (e.g., refueling areas).
- Complete dewatering in a manner that does not cause erosion or allow sediment to re-enter a watercourse or water body through the use of appropriate sediment control devices.
- Do not store hazardous materials, chemicals, fuels, or lubricants within 100 m of watercourses.
- Do not use herbicides for clearing or maintenance of riparian vegetation unless approved by Fisheries and Oceans Canada (DFO). Do not remove riparian vegetation if the riparian area is identified as part of critical habitat of an aquatic listed species at risk unless authorized by DFO.
- Develop and implement an erosion and sediment control plan that reduces the risks of sedimentation into crossed watercourses during construction.
- Use clean materials for construction, free of fines and debris.
- Repair erosion and sediment control measures and structures if damage occurs.

- Limit disturbance of the banks, and stabilize and reclaim the site to pre-construction conditions, as soon as possible after construction.
- Machinery will arrive on site in a clean condition and maintained free of fluid leaks.
- Schedule work to avoid wet, windy, and rainy periods to reduce the risk of erosion and sedimentation.
- Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent deleterious substances from entering the water.

Mitigation measures during operations are not expected to be required.

9.7 Wildlife and Wildlife Habitat including Species at Risk and Migratory Birds

Limited effects on wildlife habitat associated with construction of the power generation facility (PGF) are anticipated as the majority of the site has been stripped during quarrying and only a small patch of native vegetation remains. Following completion of the PGF, pipeline and transmission line construction, and post-construction reclamation of the pipeline and transmission line ROWs, the majority of potential effects will cease.

Project operation will have negligible residual effects on wildlife and wildlife habitat. As the PGF will be void of vegetation, wildlife use is anticipated to be low and temporary.

Mitigation measures during construction include:

- Ensure that noise abatement equipment on the facility is maintained in good working order.
- Ensure that noise abatement equipment on vehicles and machinery is maintained in good working order.
- Minimize vehicle and equipment idling.
- Facility lighting will be as efficient as possible, while providing enough light to make the site safe and secure.
- Perimeter lighting will be directed inward towards the PGF to minimize light trespass to the environment and surrounding areas as much as possible.
- Install bird nest and perch deterrents to protect birds and infrastructure according to industry standards.

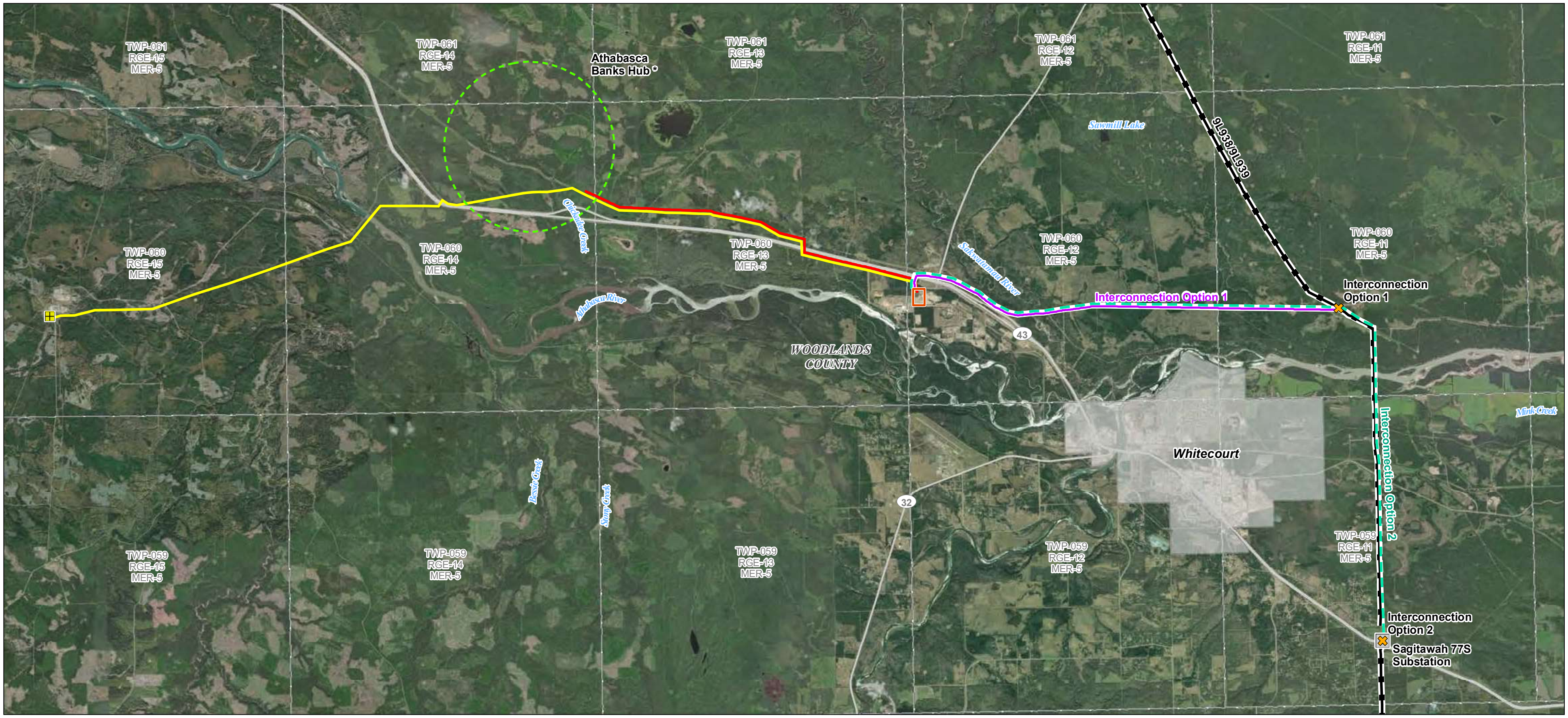
Mitigation measures during operations are not expected to be required.

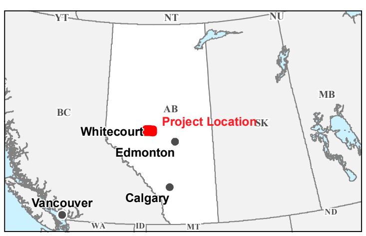
10 Contact Information

We would be pleased to discuss the Project further with you by phone, email, or meeting. To schedule a meeting please contact Zoe Rezac, Moraine’s engagement consultant with Stantec Consulting Ltd, at zoe.rezac@stantec.com or 780-917-8188.

APPENDIX A
Figures

Appendix A Figures





Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Government of Alberta and Canada, Stantec and General Electric
3. Background Image: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- Interconnection Site
- Existing Substation
- NGTL Windfall Meter Station
- Interconnection Option 1
- Interconnection Option 2
- Preferred CO_2 Pipeline Route
- Preferred Natural Gas Pipeline Route
- Athabasca Banks Hub
- Proposed Facility
- AESO 240 kV Transmission Line
- Township
- Urban Area

* - Connection Point(s) within Hub area to be determined

0 1 2 3 4 Kilometres
(At original document size of 11x17)
1:125,000

N

Stantec

Project Location
Whitecourt, Alberta

Prepared by SL on 2023-02-13
TR by SM on 2023-02-13
IR Review by JD on 2023-02-13

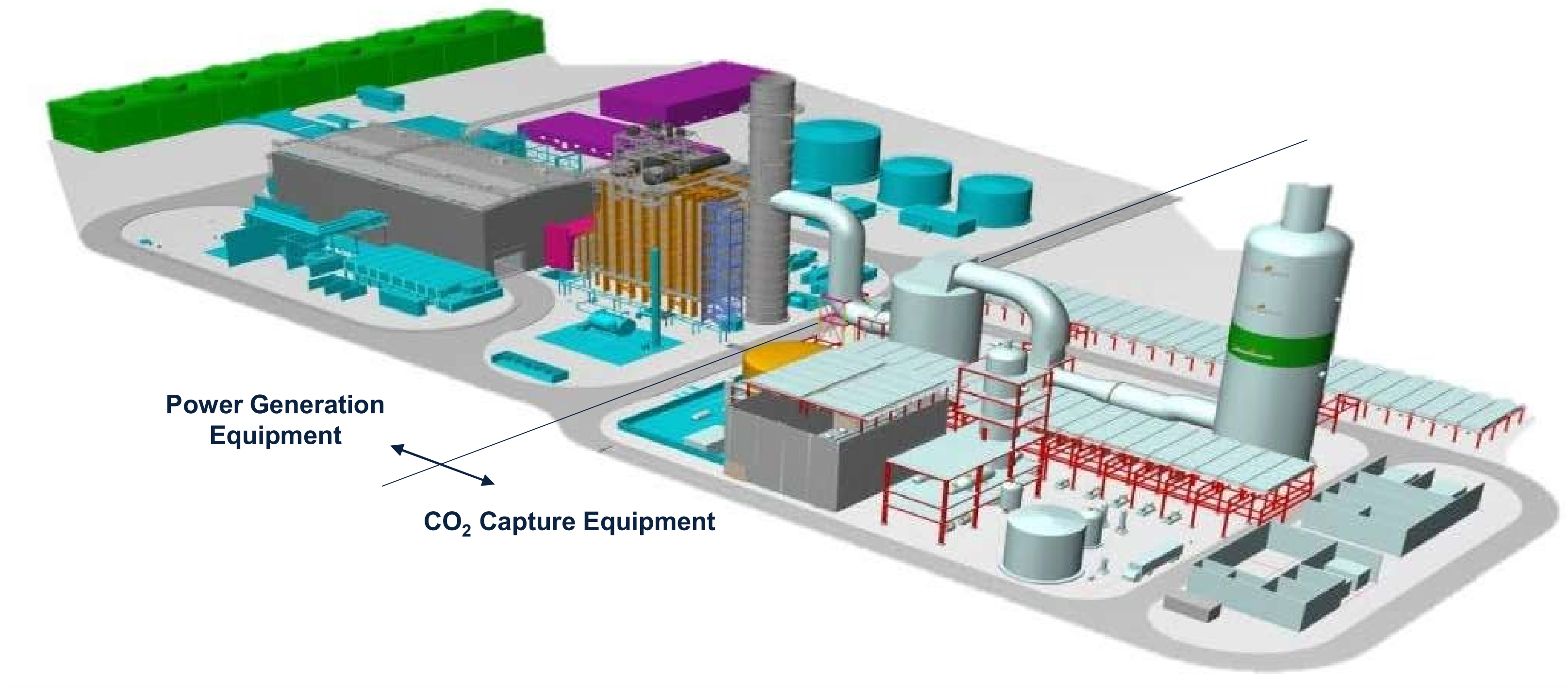
Client/Project
110220760-010
Client: Moraine Initiatives Ltd.
Project: Moraine Power Generation Project
Initial Project Description

Figure No.
1

Title
Project Overview

\\Ca0002-ppfss05\geomatics\Clients\General_Electric\Sagitwah_Cogen\Figures\110220760_010_InterconnectionOp2.mxd Revised: 2023-02-17 By: wahowse

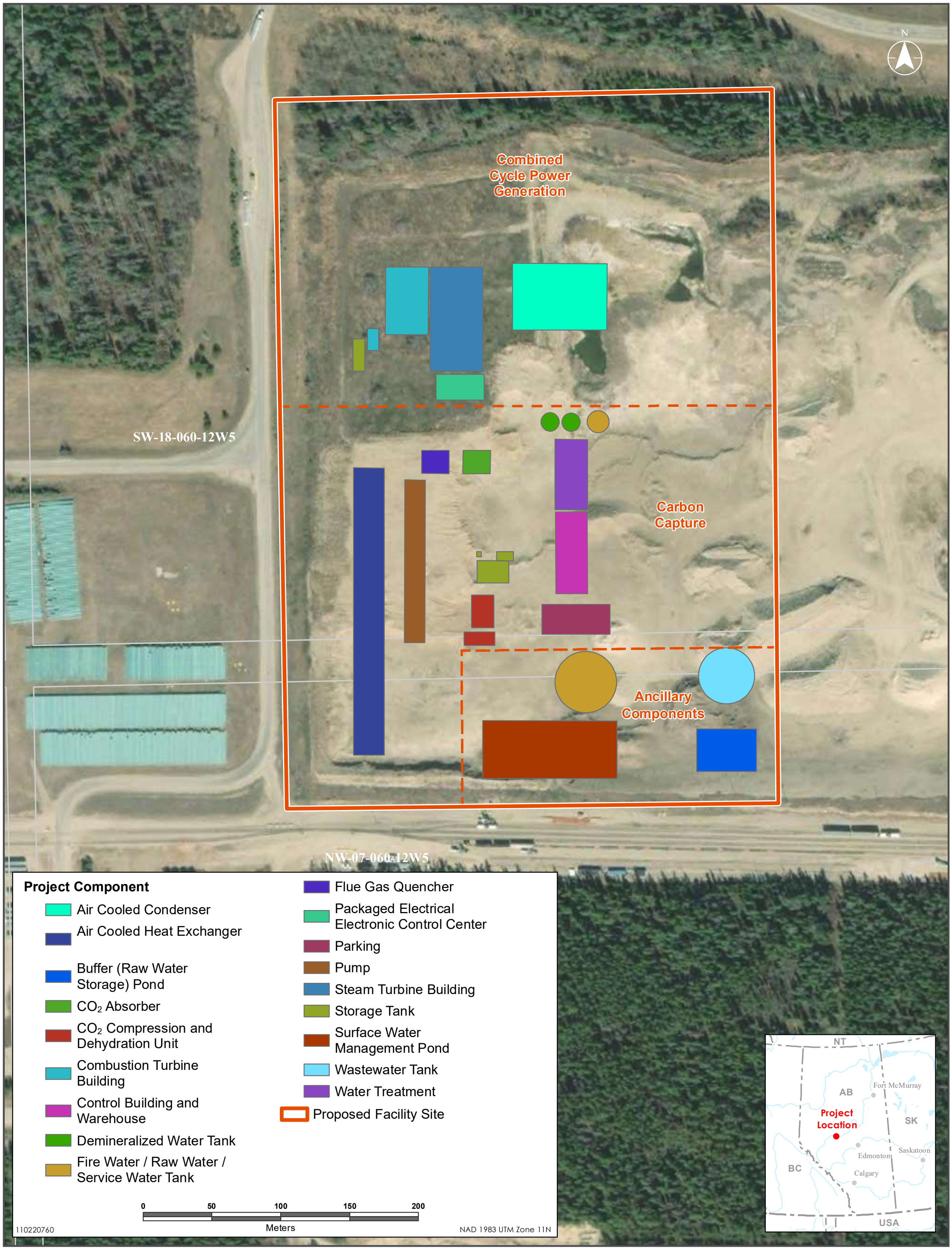
Preliminary Plant Rendering*



*Rendering not to scale; Power Generation Equipment + CO_2 Capture Equipment footprint is estimated to be ~40 acres or ~1/4 of a quarter section of land

Figure No.
2
Title
Preliminary Plant Rendering

\\Ca0002-ppfss05\geomatics\Clients\General_Electric\Sagitiwah_Cogen\Figures\110220760_009_PlotPlan_inline.mxd 2/17/2023 2:29:58 PM wahowse



Sources: Base data provided by the Governments of Canada, and Alberta.
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Stantec

Figure No.
5

Title
General Layout of the Moraine Power Plant

From:	Perret, Michele
To:	Neil Shewchuk
Subject:	Moraine Radio Ad
Date:	Monday, June 19, 2023 3:17:00 PM

RADIO AD DRAFT MORAINE
30 second ad
Moraine Initiatives Limited is hosting two public Open Houses to discuss their proposed Power Generation Project in Woodlands County near Whitecourt.

The proposed natural gas-fired power generation facility will include integrated carbon dioxide capture to produce near-zero emissions electricity to meet the needs of Alberta electricity customers.

Please join the Moraine team on Wednesday June 28th from 2 to 4 pm or 6 to 8 pm at the Whitecourt Golf & Country Club.

Information and subject matter experts from the Moraine team will be happy to explain the Project and answer your questions.

Michele Perret
Community Engagement Lead
Stantec
Suite #300, 10220 – 103 Ave NW, Edmonton, Alberta, T5J 0K4
Phone: 780-917-1820
Mobile: 780-700-3842
michele.perret@stantec.com

MORAINE **POWER GENERATION** PROJECT

Meet the team!

Ankur Mathur
Project Lead

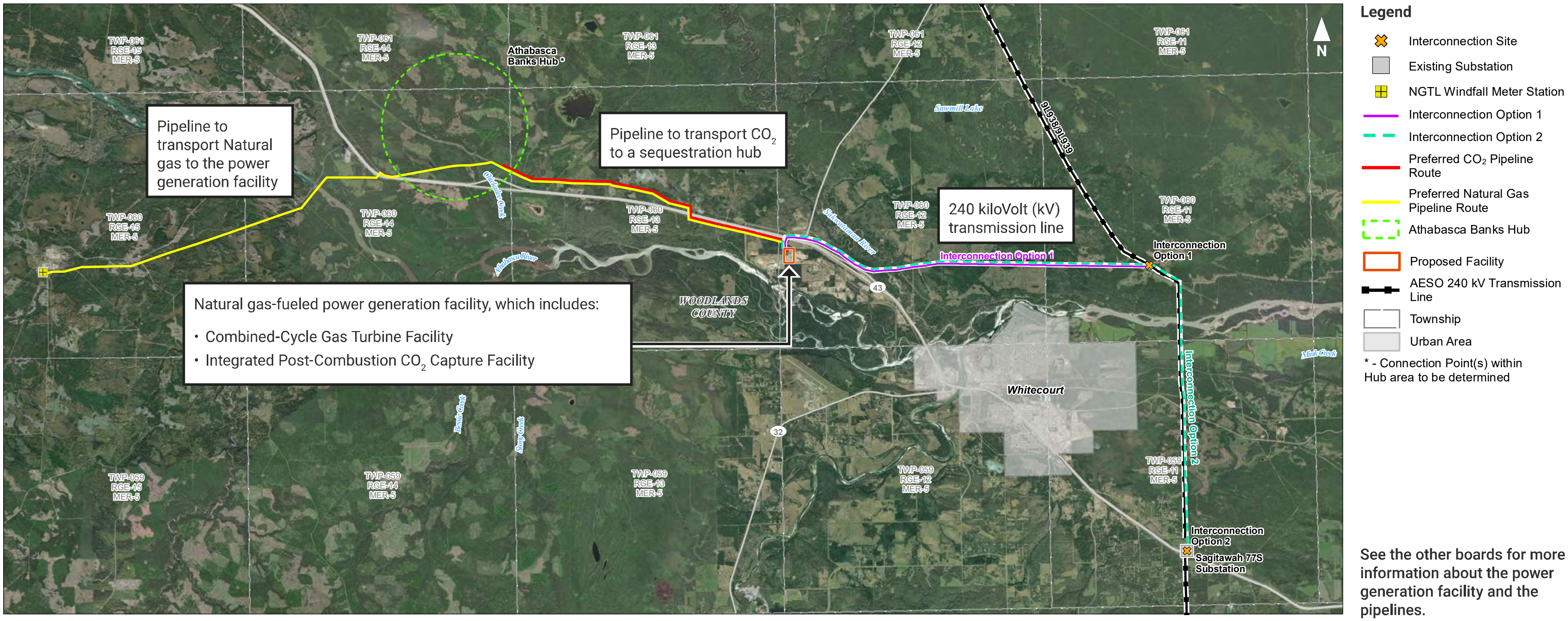
Roy S. Belden
Environmental Manager/ Counsel

Bridget Dougherty
Development Manager

John Nutter
Technical Manager

Moraine Power Generation Project owned by Moraine Initiatives Ltd. (Moraine), which is a wholly owned subsidiary of the General Electric Company.

MORAINE **POWER GENERATION** PROJECT

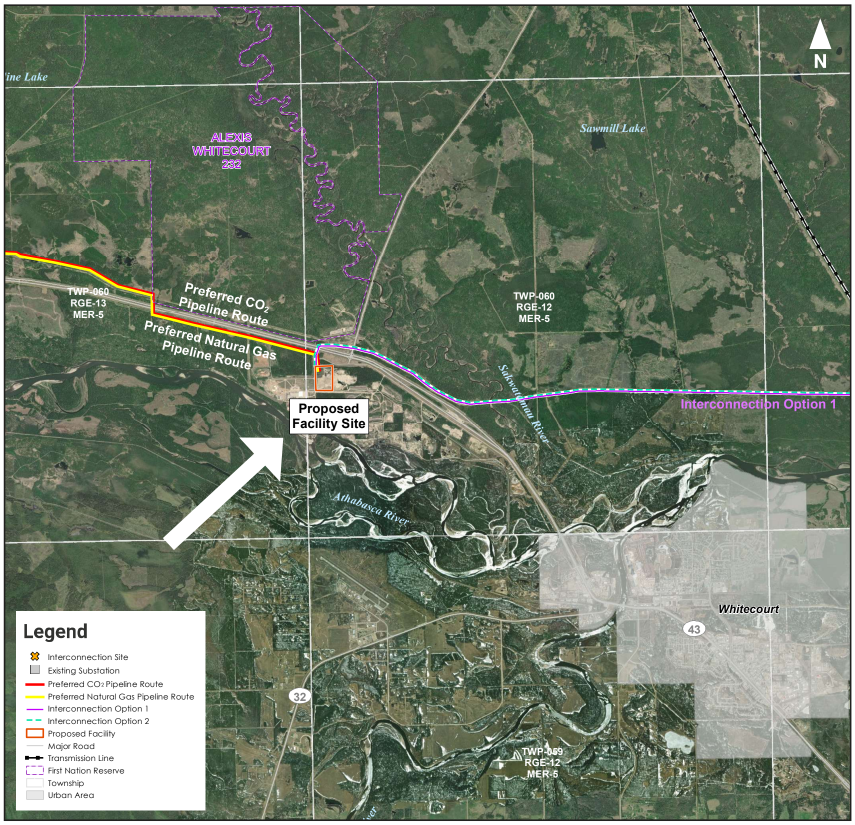


See the other boards for more information about the power generation facility and the pipelines.

The Project will supply reliable and affordable low-emitting generation electricity for Albertans by capturing CO_2 emissions.

- A state-of-the-art combined cycle power generation facility that will produce 465MW of electricity
- Compliant with Canada's proposed Clean Electricity Regulations
- Meet Canada's objectives of achieving net-zero emissions from the electricity grid by 2035
- The Project will be owned by Moraine and operated by an experienced third-party operator
- A staff of approximately 32 people including operators, engineers, and support staff will operate the facility once complete
- An estimated construction work force of 600-700 persons, over a 3-year period and construction workers are expected to be from the area

POWER GENERATION FACILITY **SITE**

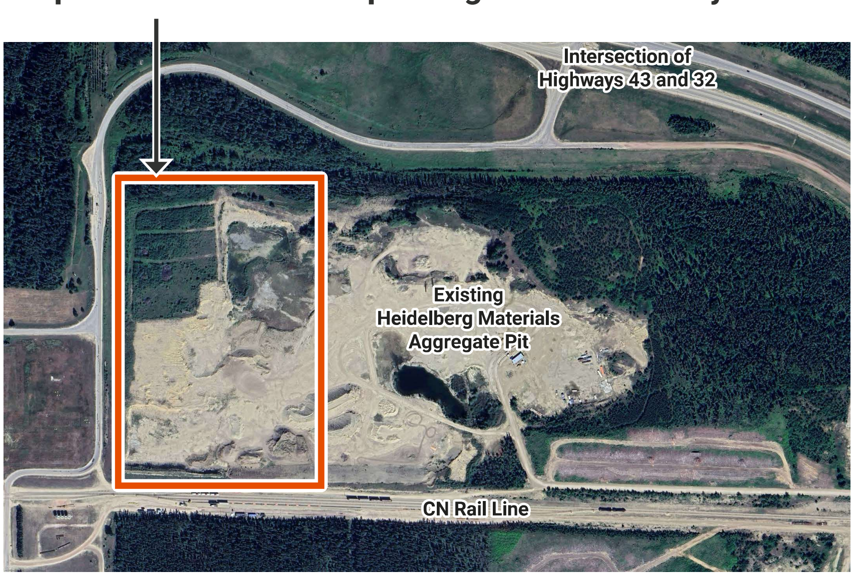


The power generation facility will house the combined cycle gas turbine and the Integrated Post-Combustion CO_2 Capture Facility.

The power generation facility is proposed to be constructed on Alberta Crown lands at a brownfield site. The location is southwest of the intersection of highways 43 and 32, just north of the Athabasca River in Woodlands County near Whitecourt, AB.

The site is currently under disposition to Heidelberg Materials and is being used to extract aggregate (gravel).

Proposed location of the power generation facility



APPLICABLE LEGISLATION

- *Impact Assessment Act*
- *Species At Risk Act*
- *Migratory Bird Convention Act*
- *Environmental Protection and Enhancement Act*
- *Alberta Utilities Commission Act / Hydro and Electric Energy Act*
- *Alberta Water Act*
- *Alberta Public Lands Act*
- *Alberta Municipal Government Act*

POWER GENERATION **FACILITY**

Project Components

Natural gas-fueled power generation facility, which includes:

Combined-cycle gas turbine facility (CCGT)

1) Gas turbine burns fuel:

The gas turbine compresses air and mixes it with fuel that is heated to a very high temperature. The hot air-fuel mixture moves through the gas turbine blades, making them spin.

The fast-spinning turbine drives a generator that converts a portion of the spinning energy into electricity.

2) Heat recovery system captures exhaust:

A heat recovery steam generator (HRSG) captures exhaust heat from the gas turbine that would otherwise escape through the exhaust stack.

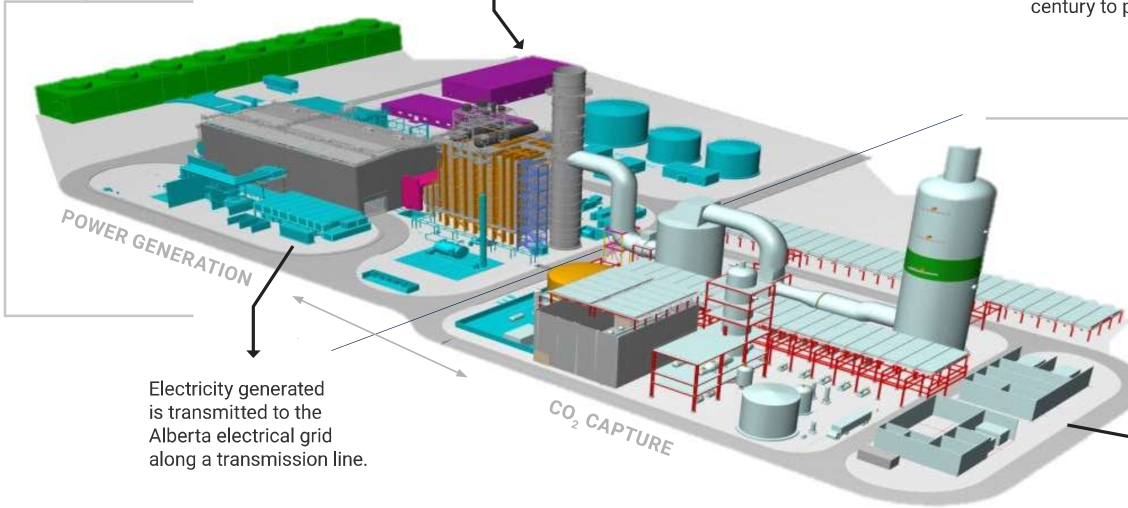
The HRSG creates steam from the gas turbine exhaust heat and delivers it to the steam turbine.

3) Steam turbine delivers additional electricity:

The steam turbine sends its energy to the generator drive shaft, where it is converted into additional electricity.

How A Combined Cycle Power Plant Works | Gas Power Generation | GE Power

The Natural Gas Pipeline fuels the gas turbine.



Electricity generated is transmitted to the Alberta electrical grid along a transmission line.

Integrated post-combustion CO_2 capture facility (ICCF)

The integrated post-combustion CO_2 capture facility will remove up to 95% of the CO_2 contained in the exhaust gas using an amine CO_2 absorber.

This amine-based procedure has been widely used in Western Canada since the mid-20th century to process natural gas.

The captured CO_2 is transported by a pipeline to a sequestration hub.

Carbon Capture Solutions | GE Power

*Rendering not to scale; Power Generation Facility footprint is estimated to be ~40 acres or ~1/4 of a quarter section of land

TRANSMISSION LINE

Existing H-frame 240 kV transmission line in the area (foreground of photo)

APPLICABLE LEGISLATION

- *Species At Risk Act*
- *Migratory Bird Convention Act*
- Alberta Electric System Operator – Technical Requirements for Interconnecting Generators and Technical Requirements for Interconnecting Loads
- *Alberta Electric Utilities Act*
- *Alberta Public Lands Act*
- *Historical Resources Act*

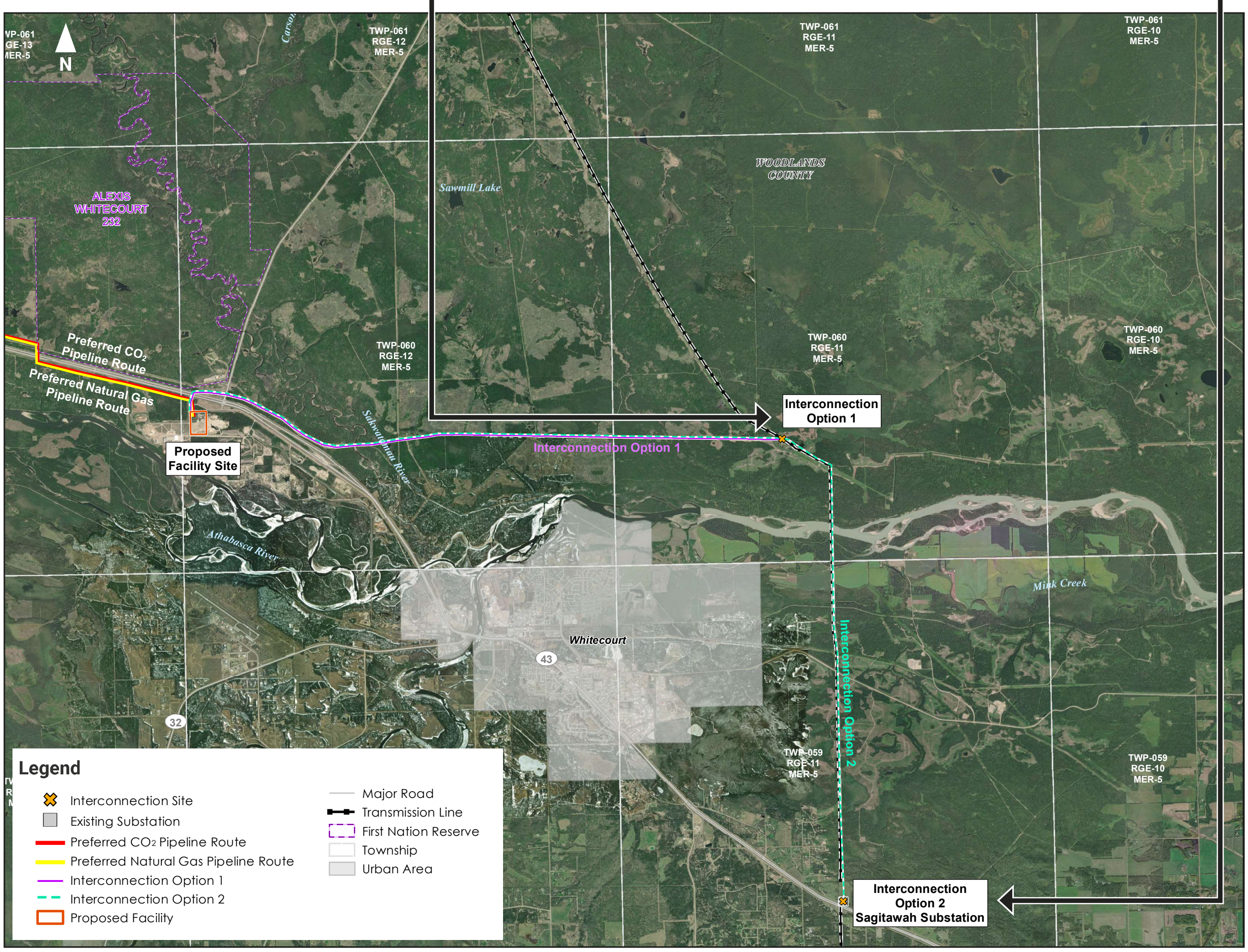
Electricity generated will be transmitted to the Alberta electrical grid along a new 240 kV transmission line.

Currently there are two proposed transmission line interconnection options:

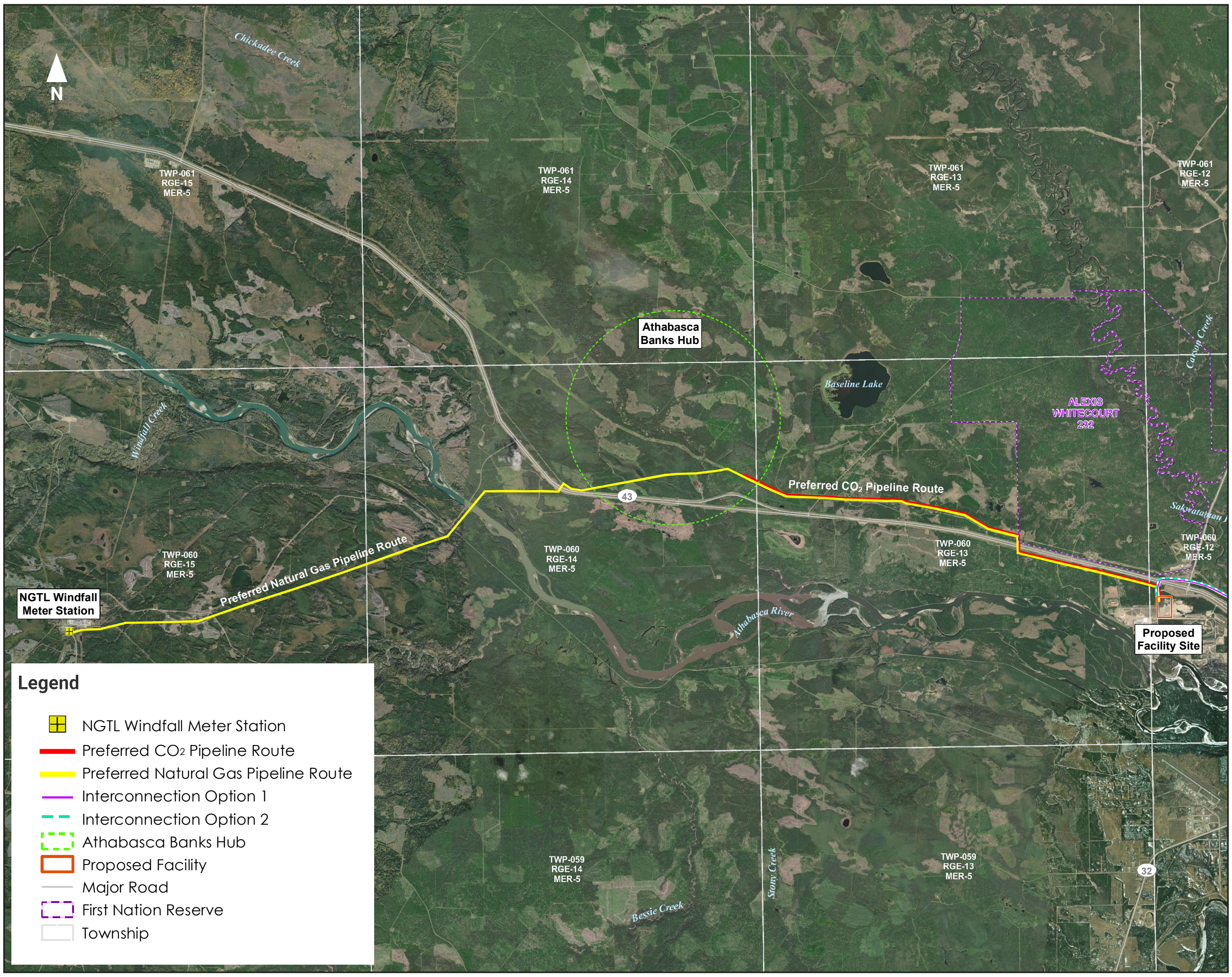
Option 1: Build 14 km of new transmission line in a new right-of-way and connect to an existing 240 kV transmission line.

Option 2: Build all of the new infrastructure for Option 1 + build an additional 10 km of line within or adjacent to the existing 240 kV transmission line right-of-way and connect to the Sagitawah Substation.

The grid operator will evaluate the options and make a decision to minimize technical and economic impacts to the grid.



PIPELINES



The power generation facility will be fueled by sweet natural gas.

A new 30 km (approximate) pipeline will transport the natural gas from the NGTL Windfall Meter Station to the power generation facility.

Preliminary pipeline outside diameters:

- Natural Gas Pipeline = 12 inches
- CO_2 Pipeline = 10 inches

The pipelines will be regulated by the Alberta Energy Regulator.

Right-of-way of an existing pipeline in the area

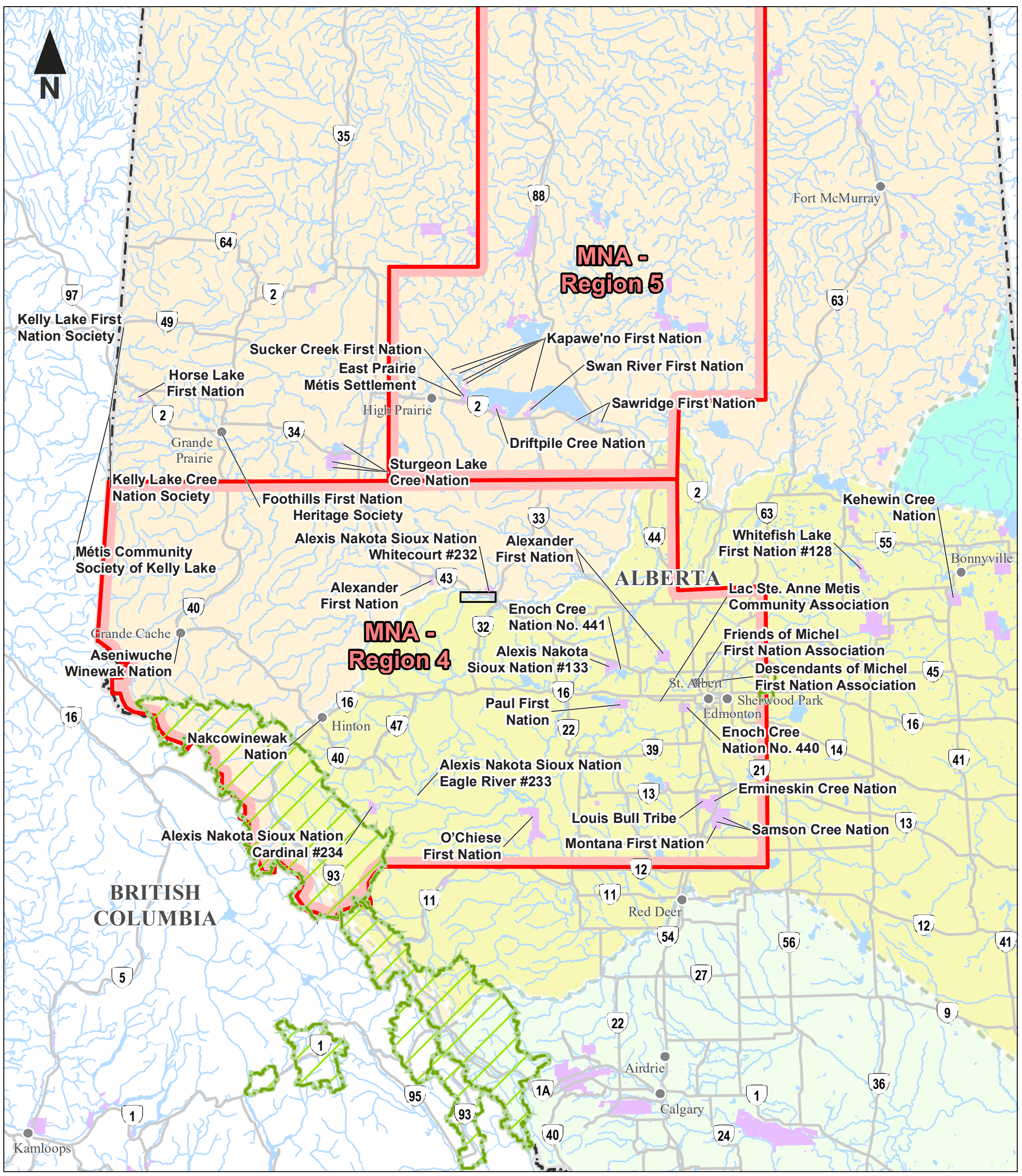
APPLICABLE LEGISLATION

- *Migratory Bird Convention Act*
- *Fisheries Act*
- *Species At Risk Act*
- *Pipelines Act*
- *Oil and Gas Conservation Act*
- *Alberta Public Lands Act*
- *Alberta Water Act*
- *Historical Resources Act*

ENGAGEMENT WITH **INDIGENOUS GROUPS**

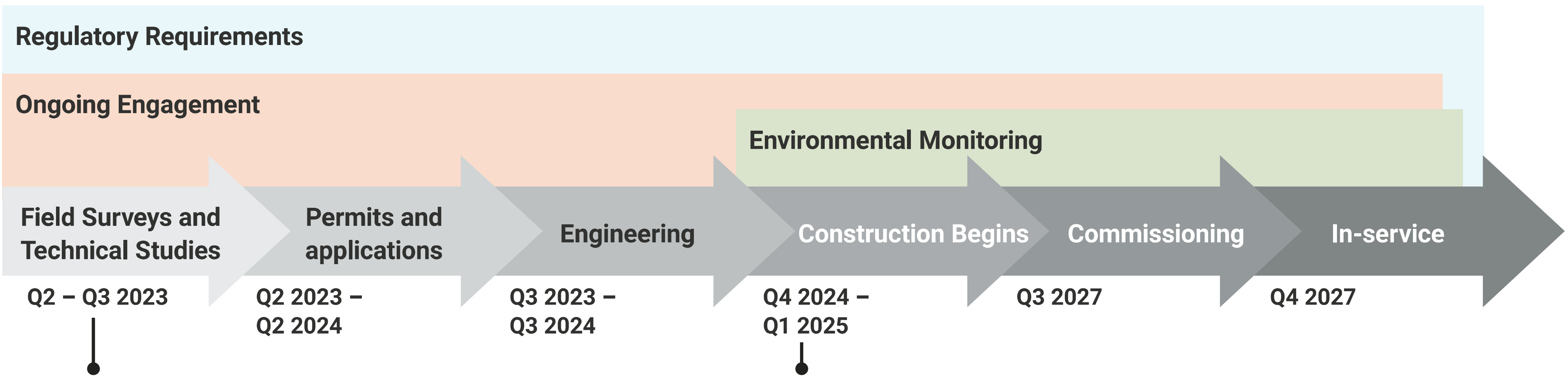
The Impact Assessment Agency of Canada directed Moraine Initiatives Ltd. to engage 28 Indigenous groups.

Moraine Initiatives Ltd. is committed to an engagement process that incorporates input from Indigenous groups to facilitate information sharing, two-way dialogue in order to understand perceived project impacts, incorporate mitigation measures, consider Indigenous knowledge, and advance reconciliation.



Legend

PROJECT **SCHEDULE**



Field Surveys and Technical Studies include:

- Geotechnical investigation
- Vegetation surveys to assess:
  - Rare plants
  - Rare ecological communities
  - Introduction and spread of weeds
- Wildlife habitat assessments
- Aquatics field-based habitat assessment at Athabasca River and Chickadee Creek for pipeline crossings
- Soils surveys to assess topsoil depths and provide salvage recommendations

Construction Includes:

- Clearing vegetation
- Access road construction
- Surface preparations
- Foundation excavation, pilings, and underground piping
- Building construction including mechanical, electrical, and switchyard construction
- Installation of major equipment, pipelines, and transmission line
- Connection of process and ancillary equipment
- Site drainage and erosion control
- Site clean-up and restoration

REGULATORY **REQUIREMENTS**

Federal

Approvals / Permits

- Under the *Impact Assessment Act* – the Agency will review the Initial Project Description and Detailed Project Description to determine if an Approval by the Federal Government is required.
- The Department of Fisheries and Oceans will be requested to review any potential effects to fish and fish habitat from the Project (construction and operations) to determine if an authorization or permit is required under the *Fisheries Act.*

Provincial

Approvals / Permits

- An Industrial Approval under the *Environmental Protection and Enhancement Act* for the power generation facility will be required for construction and operations of the facility.
- The power generation facility and transmission line will be permitted by the Alberta Utilities Commission (Rule 007 and Rule 012).
- The natural gas pipeline and CO_2 pipeline will be approved through multiple Alberta Energy Regulator applications including: Conservation and Reclamation, Directives 065.
- *Water Act* approvals and licenses will be obtained for any water diversions, waterbody crossings or temporary disturbance to wetlands.
- Public Land dispositions will be obtained for the facility, pipelines, and transmission line to the extent they are located on Provincial crown land.
- *Historical Resource Act* approval will be obtained for all Project disturbance footprints, including completion of Historical Resources Impact Assessments to assess areas of high potential for resources.

Municipal

Approvals / Permits

- Woodlands County Municipal Development Plan Bylaw 406/13
- Woodlands County Land Use Bylaw 490/17
- Intermunicipal Development Plan for Woodlands County and the Town of Whitecourt Bylaw 401/12

PROJECT **CONSIDERATIONS**

Physical Environmental

The power generation facility will be situated on a brownfield site, where disturbance to the natural environment has already occurred. Pipelines and the transmission line for the Project are anticipated to be adjacent to existing rights-of-way.

Areas of focus for the Project include:

- Air Quality
- Noise
- Groundwater
- Soils
- Vegetation and Wetlands
- Wildlife and Wildlife Habitat
- Surface Water and Fish and Fish Habitat
- Historical Resources

Effects identified will be avoided, mitigated, or managed through approved methods, which may include:

- Ongoing monitoring
- Management plans
- Restricted activity periods and activities

Over 90% lower CO_2 emission intensity than other state of the art combined cycle power generation in Alberta

Historical and Cultural

The Project will consider Traditional Land Use, Physical and Cultural Heritage, and Historical, Archaeological and Paleontological Resources.

A Historic Resources Impact Assessment has been requested by Alberta Arts, Culture, and Status of Women (ACSW) for areas of high potential for archaeological, palaeontological and historical occurrences (e.g., near the Athabasca River, where pipeline crossings will occur).

Mitigation measures will be completed as directed by ACSW including activities such as:

- Avoidance of impact through project redesign or alignment of pipelines and transmission line
- Field-based impact assessments (archaeology and/or paleontology)
- Site-specific mitigation measures (e.g., controlled surface collection of cultural materials
- Archaeological excavation
- Documentation of historical structures activities

Indigenous Health, Social, and Economic

Indigenous Health Considerations

Potential effects on Indigenous health are being evaluated based on direct and indirect air quality effects and noise impacts from the construction and operation of the Project.

The Facility is directly adjacent to other industrial development and will be built on a brownfield site, currently used as natural resource extraction. The effects from equipment emissions and noise during construction are anticipated to be localized and not significant, which will limit the adverse effects on Indigenous peoples.

Indigenous Social and Economic Considerations

Socio-economic effects are anticipated to be positive for Indigenous groups due to opportunities for local employment during construction and operation of the Project.

Opportunities for socio-economic effects will be further evaluated based on engagement with Indigenous groups.

From:	Rezac, Zoë
To:	carol wildcat; Danny Bellerose
Cc:	MoraineROC
Subject:	Moraine Power Generation Project - Project Update
Date:	Tuesday, August 29, 2023 8:11:00 AM
Attachments:	06272023_Indigenous_Gathering_Notes_v1.docx All_Indigenous_Presentation_v4_final_reduced.pdf

Good morning Carol and Danny,

Thank you for meeting with us in June at the Eagle River Resort. It was nice to have the opportunity to meet with you in person. It is important to us to keep communication channels open as this Project progresses. We appreciate the information that you have provided to us to date. We will continue to keep ourselves available to meet with you to provide project updates and answer questions. We want to continue to listen and learn about your nation including:

- What's important to your nation?
- How does the project potentially affect your Indigenous and treaty rights?
- And how you would like to be engaged?

We now have a Project website (morainepower.ca) that includes Project information and contact information. We will continue to update the website as the Project progresses.

The federal Impact Assessment Agency of Canada (IAAC) sent us a Summary of Issues on July 17, 2023 following the close of their comment period on July 7, 2023. We are now working through the issues to develop the Detailed Project Description, or DPD, to file with IAAC later this month or early September. The DPD will address the summary of issues and provide more information on potential effects and information gathered from engagement with Indigenous nations and the local community.

Thank you again for meeting with us in June. A copy of the meeting notes from the session are attached along with the presentation slides. Please review the meeting notes and let us know of any errors or omissions.

Please contact me if you would like to set up a meeting with the Moraine team.

Thank you,

Zoe Rezac
Community Engagement Consultant
Stantec
Suite #300, 10220 – 103 Ave NW
Edmonton, Alberta, T5J 0K4
Phone: 780-917-8188
<personal information removed>

From: Rezac, Zoë
To: nakcowinewak@telus.com
Cc: MoraineROC
Subject: Moraine Power Generation Project - Project Update
Date: Friday, August 25, 2023 2:44:00 PM

Good afternoon,

We are sending you this email as we believe it is important to keep communication channels open as this Project progresses. We appreciate the information that you have provided to us to date. We will continue to keep ourselves available to meet with you to provide project updates and answer questions. We want to continue to listen and learn about your nation including:

- What's important to your nation?
- How does the project potentially affect your Indigenous and treaty rights?
- And how you would like to be engaged?

We now have a Project website (morainepower.ca) that includes Project information and contact information. We will continue to up date the website as the Project progresses.

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Please contact me if you would like to set up a meeting with the Moraine team.

Thank you,

Zoe Rezac
Community Engagement Consultant
Stantec
Suite #300, 10220 – 103 Ave NW
Edmonton, Alberta, T5J 0K4
Phone: 780-917-8188
<personal information removed>

Appendix D Air Quality Technical Memo

Stantec **Memo**

To:	Roy S. Belden, Vice President Moraine Initiatives Limited	From:	Reid Person, M.Eng., P.Eng. Principal Air Quality Engineer Stantec, Calgary
Project/File:	110220760	Date:	August 31, 2023

Reference: Moraine Power Generation Project Air Quality Assessment

Stantec Consulting Ltd. (Stantec) was contracted to conduct air dispersion modelling to assess potential effects on air quality from the Moraine Power Generation Project (the Project). The Project includes a combined-cycle natural gas turbine (CCGT) facility for electricity generation with integrated carbon dioxide (CO_2) capture capabilities. The combined-cycle CCGT will be constructed at a brownfield site located at SW 18-60-12-W5M and NW 7-60-12-W5M in Woodlands County near Whitecourt, Alberta (AB). Stantec applied the AERMOD dispersion model to predict maximum criteria air contaminant (CAC) concentrations for nitrogen dioxide (NO_2), fine particulate matter ($PM_{2.5}$), carbon monoxide (CO) and sulphur dioxide (SO_2) associated with the Project.

The following memo summaries the inputs, methodology, and results of the air quality assessment completed for the Project. As there is no federal dispersion modelling guidance, the methods in this assessment follow the recommendations in the Alberta Environment and Parks (AEPA) Air Quality Model Guideline (AQMG; AEP 2021).

1 Ambient Air Quality Objectives

Air quality is assessed by comparing measured or predicted concentrations to regulatory objectives and standards. AEPA has established Ambient Air Quality Objectives and Guidelines (AEP 2019) for a number of substances. They are referred to as Alberta Ambient Air Quality Objectives (AAAQO).

The Government of Canada have established Canadian Ambient Air Quality Standards for NO_2, $PM_{2.5}$, and SO_2. The CCME (2019) have stated that achievement of the CAAQS is determined on an airshed and air zone basis, which cover broad geographical areas. They are regional ambient standards and not intended to be applied to determine the acceptability of individual projects or facilities as fence line standards (CCME 2019). Rather, they are used by provinces and territories to guide air zone management actions intended to reduce ambient concentrations below the CAAQS and prevent CAAQS exceedances.

Oxides of nitrogen (NO_X) are produced in most combustion processes and are almost entirely made up of nitrogen oxide (NO) and NO_2. Together they are often referred to as NO_X. Air quality regulators such as Environment and Climate Change Canada, AEPA and the United States Environmental Protection Agency (U.S. EPA) focus on management of NO_2 concentrations rather than NO_X for several reasons including a large body of knowledge on NO_2 concentrations, human exposure and dose, and health effects. As such, regulatory ambient air quality objectives exist for NO_2, and not for NO or NO_X. The ambient air quality objectives and standards considered in this assessment are summarized in Table 1.

Table 1 Ambient Air Quality Objectives

Substance	Averaging Period	AAAQO [a]	CAAQS 2020 [b]	CAAQS 2025 [b]
		µg/m³	µg/m³	µg/m³
NO_2	1-hour	300	113	79
	Annual	45	32	22.6
$PM_{2.5}$	24-hour	80	27	-
	Annual	29	8.8	-
CO	1-hour	15,000	-	-
	8-hour	6,000	-	-
SO_2	1-hour	450	183	170
	24-hour	125	-	-
	30-day	30	-	-
	Annual	20	13.1	10.5

NOTES:
[a] Alberta Ambient Air Quality Guidelines (AEP 2019)
[b] Canadian Ambient Air Quality Standards (CCME 2021)
Criteria are referenced under the standard conditions of 25ºC and 101.325 kPa.

2 Regional Setting

The Project is located in Woodlands County approximately 10 km northwest of Whitecourt, Alberta, within SW 18-60-12-W5M and NW 7-60-12-W5M. The Project is in a rural area with few nearby industrial emission sources other than the adjacent Alberta Newsprint Company (ANC) facility. The ANC facility is an operating papermill and is a source of combustion emissions associated with paper production and an integrated cogeneration facility which produces heat and electricity. The emissions from the ANC facility are included in the modelling to account for cumulative effects.

2.1 Study Area

For the purposes of assessing the effects of the Project emissions on air quality, a study area was selected to encompass the area within which the potential effects from the Project can be predicted with a reasonable degree of accuracy and confidence, generally accepted to extend from the Project to locations where predicted concentrations decrease to approximately 10% of the AAAQO, as required by the AQMG (AEP 2021).

A 20 km by 20 km study area centered on the Project was selected for the air quality assessment (refer to Figure 1, Attachment A). The Project base elevation is approximately 732 m above sea level (asl). The Athabasca River runs through the study area. There are lower elevations along the Athabasca River and other watercourses within the study area, and areas with higher elevations in the northwest, northeast and southwest. Terrain elevations within the study area range from approximately 684 to 937 m asl.

2.2 Background Ambient Air Quality

The Project is located within the West Central Airshed Society (WCAS), a multi-stakeholder, not-for-profit organization responsible for collecting and sharing air quality monitoring data information on ambient air quality. The WCAS includes 12 continuous ambient air quality monitoring stations that measure a wide range of substances near both industrial facilities and communities.

Representative background ambient air quality concentrations for the air quality study area were determined based on analysis of regional ambient air quality monitoring data. There are no continuous monitoring stations located in or near Whitecourt. Consistent with the AQMG, three years of measured NO_2, SO_2 and $PM_{2.5}$ concentrations from the Edson air quality monitoring station located 75 km southwest of the Project were used to determine baseline. Measured concentrations for CO were obtained from the Fort Saskatchewan monitoring station located 175 km east-southeast of the Project which is the closest monitoring station with CO measurements. The ambient monitoring data from Edson and Fort Saskatchewan stations for the most recent three years (2019-2021) with complete data record (at least 75% complete) was analyzed to determine representative baseline concentrations following the calculation methodology in the AQMG (AEP 2021). For SO_2, the years 2018 and 2020 to 2021 were used as the measurements in 2019 appear anomalously low. The representative baseline concentrations used for the assessment of the Project emissions are summarized in Table 2 and compared to the AAAQO.

Reference: Moraine Power Project Air Quality Assessment

Table 2 Estimated Ambient Background Concentrations

Station	Years	Substance	Averaging Period	Ambient Background Concentrations [a]	AAAQO	Comparison of Background to AAAQO
				(µg/m³)	(µg/m³)	(%)
Edson	2019-2021	NO_2	1-hour	35.6	300	11.9
			Annual	9.8	45	21.8
	2019-2021	$PM_{2.5}$	1-hour	7.0	80	8.8
			24-hour	6.6	29	22.8
	2018, 2020-2021	SO_2	1-hour	2.2	450	0.5
			24-hour	2.0	125	1.6
			30-day	0.8	30	2.8
			Annual	0.5	20	2.6
Fort Sask	2019-2021	CO	1-hour	365	15,000	2.4
			24-hour	364	6,000	6.1

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

3 Emissions

3.1 Project Emissions

The Project includes one combustion turbine unit comprised of a gas turbine generator (GTG) and one heat recovery steam generator (HRSG) with duct burner. The proposed GTG is a 465 MW GE 7HA.02 gas turbine paired with a HRSG and a duct burner. The HRSG exhaust gas will go through an amine-based CO_2 absorber to capture CO_2 before its released to atmosphere through an absorber stack. The emission rates for NO_X, SO_2, $PM_{2.5}$, and CO were provided by GE based upon manufacturer performance specifications. Table 3 shows stack dimensions, exhaust parameters and emission rates. Other potential project emission sources are expected to operate intermittently and/or associated with non-routine scenarios such as backup diesel generators, start up fuel gas heaters or firewater pump engines and are not modelled. The combined cycle power facility will include advanced pollution control technologies to minimize emissions including water injection, selective catalytic reduction (SCR) or similar control technology to limit NO_X emissions.

Table 3 Stack and Emission Parameters Associated with Project

Source ID		Absorber Stack
Unit Description		GE Combined Cycle Plant with Carbon Capture
Temporal Variation		Continuous
Fuel		Natural Gas
Power Output (net)	kW	465,000
Heat Input (HHV)	kW	1,089,781
Stack Location		
UTM NAD 83	m E	578564
	m N	6004548
Base Elevation	m asl	732
Stack Parameters		
Height	m	60.96
Diameter	m	4.88
Exit Velocity	m/s	34.5
Exit Temperature	K	303
Emission Rate		
NO_X	kg/h	30.9
CO	kg/h	35.2
$PM_{2.5}$	kg/h	6.94
SO_2	kg/h	1.45

3.2 Regional Emissions

Emissions from the nearby Alberta Newsprint Company Facility (ANC) facility were also included in dispersion modelling. Emission sources at the ANC facility include natural gas fired boilers, a vent stack and 10 Caterpillar G16CM34 generators as part of an attached cogeneration facility. Total maximum emissions of NO_X, SO_2, $PM_{2.5}$ and CO are 33.9 kg/h, 0.15 kg/h, 0.33 kg/h, and 1705 kg/h, respectively. The emission estimate for the ANC facility is conservative as the generators associated with the cogeneration facility operate intermittently depending on electricity market conditions. For example, average NO_X, $PM_{2.5}$ and CO emissions in 2022 were 12 kg/h, 0.14 kg/h, and 41 kg/h, respectively. Actual emissions from the ANC are typically less than 50% of the maximum approved emission limits used in dispersion modelling. Detailed emission source information at this facility is provided in Attachment B. Stack and emission data were obtained from the 2018 Alberta Annual Emissions Inventory Report (AEIR) data.

4 Modelling Methodology

The effects of the Project emissions on ambient air quality were evaluated using dispersion modelling. Dispersion models provide a scientific link between the emission sources and downwind concentration profiles associated with the sources. Dispersion models incorporate meteorological conditions to account for the transport and dilution of the plume in the atmosphere and incorporate terrain influences. All modelling conducted in this air quality assessment follows the AQMG (AEP 2021). The maximum predicted air concentration outputs by the dispersion model, including the background concentration, were assessed based on comparison with the applicable ambient air quality criteria. The following sections describe the dispersion modelling methodology applied in this assessment.

4.1 Dispersion Model

This dispersion modelling assessment uses the most recent version of the U.S. EPA AERMOD dispersion model (version 22112). Default, and the allowed non-default model options specified in the AQMG (AEP 2021), were used in AERMOD for this assessment.

4.2 Dispersion Meteorology

Climate and meteorology influence the manner in which air emissions from industrial and natural sources disperse into the atmosphere, and hence have a direct effect on air quality. For this assessment, five years of Weather Research Forecast (WRF) version 4.2.1 meteorological data from 2015 to 2019 were used in dispersion modelling, as per AEPA AQMG (AEP 2021). This WRF meteorological data were provided by AEPA. The AEPA extraction utility software MMEU2 was used to extract the site-specific AERMET format meteorological data from the WRF data.

4.3 NO_x to NO_2 Conversion

NO_X are comprised of NO and NO_2; however, only NO_2 concentrations are regulated by the AAAQO and CAAQS. The AQMG (AEP 2021) specifies several recommended methods for estimating the fraction of NO_2 concentrations in the plume for the purpose of comparison to the AAAQO. In this assessment, the Ambient Ratio Method Version 2 (ARM2) method (Podrez, 2015) was implemented to predict NO_2 concentrations.

Combustion sources such as the Project emit NO_X primarily in the form of nitric oxide (NO). Nitric oxide undergoes chemical reactions in the atmosphere (primarily reacting with ozone) to form NO_2. The ARM2 method is used to calculate NO_2 concentrations that accounts for atmospheric chemistry by determining NO_2/NO_X ratios as a function of NOx concentration. The ARM2 method is conservative as it is expected to overestimate actual NO_2/NO_X ratios. The ARM2 approach was applied using the default minimum and maximum equilibrium ratios of 0.2 and 0.9 recommended by the AQMG (AEP 2021).

4.4 Receptor Grid and Terrain

As recommended in the AQMG (AEP 2021), a series of nested Cartesian grids with increasing receptor density with proximity to the Project were applied. Receptors falling within the Project fence line and the ANC facility fence line were removed as the AAAQOs only apply at the facility boundary and beyond (AEP 2021). Receptor grids and their corresponding spacing follow the AQMG and are shown in Figure 1, Attachment A. A total of 2,505 receptors were generated for this assessment.

4.4.1 SENSITIVE RECEPTORS

Additional receptors, representing nearby residential, community and public use receptor locations were also included in the dispersion modelling (see Figure 1, Attachment A). Maximum predicted ground-level concentrations were determined for sensitive receptors and compared to the CAAQS. Straight line distances to the nearest recreational facility includes the Eagle River Casino and Travel Plaza 1 km north of the Project and the Eagle River Tourism RV Park 1.3 km to north of the Project, all of which are located on the Alexis Sioux Nation lands. There is also a rural residence located on Alexis Sioux Nation lands approximately 2.8 km north-northwest of the Project. The Whitecourt Airport is approximately 4 km south of the Project and there are rural residences adjacent to the airport also approximately 4 km south-southwest of the Project. These are the closest residences to the Project. The town of Whitecourt is approximately 6.8 km southeast of the Project. Sensitive receptors are listed in Table 4.

Table 4 Modelled Sensitive Receptors

Sensitive Receptor Description	Approximate Distance from Project (km)
Eagle River Casino and Travel Plaza	1
Eagle River Tourism RV Park	1.3
Northwest Residential Receptor	2.8
Alberta Highways Hwy 43 Weigh Scale	3
Whitecourt Airport [a]	4
Southern Residential Area [b]	4

NOTES:
[a] Modelled as 20 discrete receptors.
[b] Modelled as 67 discrete receptors.

4.5 Building Downwash

For dispersion modelling purposes, building downwash effects were considered using the U.S. EPA Building Profile Input Program (BPIP; (U.S. EPA, 1995)) for Project sources. A total of 12 proposed buildings and structures were included.

4.6 Dispersion Modelling Scenarios

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

- **Base Case** – includes emissions associated with the ANC facility (regional facility) near the Project and ambient background
- **Project Alone Case** – Includes emissions from the Project (i.e., Moraine Power Generation Plant) alone and ambient background
- **Application Case** – Includes cumulative emissions from all sources associated with the Project, ANC facility and ambient background

5 Dispersion Modelling Results

5.1 Base Case

Dispersion modelling for the Base Case includes the emissions from the nearby regional facility (ANC facility) exclusively. A summary of the maximum predicted ground-level concentrations is presented in Table 5. The concentration isopleth maps showing predicted ground-level concentrations for NO_2 associated with the Base Case are presented in Attachment A, Figures A.1 and A.2.

The maximum predicted 1-hour and annual average ground-level NO_2 concentrations associated with the Base Case are 181 and 36.4 $\mu g/m^3$, respectively. All maximum predicted NO_2 concentrations are less than the relevant AAAQOs and occur on the ANC facility fence line, as shown in Figures A.1 and A.2.

All maximum predicted $PM_{2.5}$, CO, and SO_2 concentrations associated with the Base Case are less than the relevant AAAQOs.

5.1.1 BASE CASE SENSITIVE RECEPTOR RESULTS

Summaries of the maximum predicted ground-level concentrations at sensitive receptors are presented in Table 6, Table 7, and Table 8. All maximum predicted NO_2, $PM_{2.5}$, and SO_2 concentrations associated with the Base Case at sensitive receptors are less than the relevant CAAQS except for 1-hour NO_2. The maximum predicted 1-hour NO_2 concentration at the Eagle River Casino and Travel Plaza is greater than the 2020 CAAQS. The maximum predicted 1-hour NO_2 concentration at the Eagle River Casino and Travel Plaza, Eagle River Tourism RV Park, northwest residential receptor, and Alberta Highways Hwy 43 Weigh Scale have concentrations greater than the 2025 1-hour NO_2 CAAQS. Elevated predicted NO_2 concentrations are associated with the use of conservative maximum approved NO_X emission rates for ANC facility.

5.2 Project Alone Case

Dispersion modelling for the Project Alone Case includes the emissions from the Project exclusively. A summary of the maximum predicted ground-level concentrations is presented in Table 9. The concentration isopleth maps showing predicted ground-level concentrations for NO_2 associated with the Project Alone Case are presented in Attachment A, Figures A.3 and A.4.

The maximum predicted 1-hour and annual average ground-level NO_2 concentrations associated with the Project Alone Case are 47.1 and 10.3 $\mu g/m^3$, respectively. All maximum predicted NO_2 concentrations are much less than the relevant AAAQOs. The maximum predicted 1-hour NO_2 concentration is predicted to occur 7 km northwest of the Project, on a hill, as shown in Figure A.3. The maximum predicted annual NO_2 concentration is predicted to occur 630 m east of the Project, as shown in Figure A.4.

All maximum predicted $PM_{2.5}$, CO, and SO_2 concentrations associated with the Project Alone Case are less than the relevant AAAQOs.

5.2.1 PROJECT ALONE CASE SENSITIVE RECEPTOR RESULTS

Summaries of the maximum predicted ground-level concentrations at sensitive receptors are presented in Table 10, Table 11, and Table 12. All maximum predicted NO_2, $PM_{2.5}$, and SO_2 concentrations associated with the Project Alone Case at sensitive receptors are less than the relevant CAAQS.

5.3 Application Case

Dispersion modelling for the Application Case includes the emissions from the Project and ANC facility. A summary of the maximum predicted ground-level concentrations is presented in Table 13. The concentration isopleth maps showing predicted ground-level concentrations for NO_2 associated with the Application Case are presented in Attachment A, Figures A.5 and A.6.

The maximum predicted 1-hour and annual average ground-level NO_2 concentrations associated with the Application Case are 181 and 36.4 µg/m^3, respectively. All maximum predicted NO_2 concentrations are less than the relevant AAAQOs and occur on the ANC facility fence line, as shown in Figures A.5 and A.6.

All maximum predicted $PM_{2.5}$, CO, and SO_2 concentrations associated with the Application Case are less than the relevant AAAQOs.

5.3.1 APPLICATION CASE SENSITIVE RECEPTOR RESULTS

Summaries of the maximum predicted ground-level concentrations at sensitive receptors are presented in Table 14, Table 15, and Table 16. All maximum predicted NO_2, $PM_{2.5}$, and SO_2 concentrations associated with the Application Case at sensitive receptors are less than the relevant CAAQS except for 1-hour NO_2. The maximum predicted 1-hour NO_2 concentration at the Eagle River Casino and Travel Plaza is greater than the 2020 CAAQS. The maximum predicted 1-hour NO_2 concentration at the Eagle River Casino and Travel Plaza, Eagle River Tourism RV Park, northwest residential receptor, and Alberta Highways Hwy 43 Weigh Scale have concentrations greater than the 2025 1-hour NO_2 CAAQS. The percent change from the Base Case to Application Case at these sensitive receptors, with concentrations greater than the 1-hour NO_2 CAAQS, ranges from 0% to 0.11% indicating the Project has a negligible influence on the maximum predicted ground-level concentrations. The predicted exceedances of the 1-hour CAAQS for NO_2 are attributable to the use of conservative maximum approved emission rates for the ANC facility.

Reference: Moraine Power Project Air Quality Assessment

Table 5 Maximum Predicted Concentrations Associated with Base Case

Substance	Averaging Period	Predicted Concentration	Background Concentration	Predicted Concentration + Background	AAAQO	% of AAAQO
		µg/m³	µg/m³	µg/m³	µg/m³	%
NO_2 (ARM)	1-hour [a]	146	35.6	181	300	60
	Annual	26.6	9.8	36.4	45	81
$PM_{2.5}$	1-hour [a]	6.74	7	13.7	80	17
	24-hour	2.45	6.6	9.05	29	31
CO	1-hour [a]	3,998	365	4,363	15,000	29
	8-hour	2,743	364	3,107	6,000	52
SO_2	1-hour [a]	1.91	2.2	4.11	450	1
	24-hour	0.561	2.0	2.56	125	2
	30-day	0.242	0.8	1.04	30	3
	Annual	0.135	0.5	0.635	20	3

NOTES:
[a] 9th highest predictions (AEP 2021)

Table 6 Maximum Predicted NO_2 Concentrations Associated with Base Case Sensitive Receptors Compared to the CAAQS

Substance	Averaging Period	Predicted Concentration [a]	Background Concentration	Predicted Concentration + Background	CAAQS 2020	CAAQS 2025	% of 2020 CAAQS	% of 2025 CAAQS
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	%	%
Eagle River Casino and Travel Plaza	1-hour	93.2	35.6	**129**	113	79	**114**	**163**
	Annual	0.836	9.8	10.6	32	22.6	33	47
Eagle River Tourism RV Park	1-hour	57.7	35.6	**93.3**	113	79	83	**118**
	Annual	0.501	9.8	10.3	32	22.6	32	46
Northwest Residential Receptor	1-hour	66.0	35.6	**102**	113	79	90	**129**
	Annual	0.546	9.8	10.3	32	22.6	32	46
Alberta Highways Hwy 43 Weigh Scale	1-hour	53.6	35.6	**89.2**	113	79	79	**113**
	Annual	2.36	9.8	12.2	32	22.6	38	54
Whitecourt Airport	1-hour	39.5	35.6	75.1	113	79	66	95
	Annual	0.631	9.8	10.4	32	22.6	33	46
Southern Residential Area	1-hour	41.7	35.6	77.3	113	79	68	98
	Annual	0.574	9.8	10.4	32	22.6	32	46

NOTES:
BOLD indicates exceedance of the criteria.
[a] Calculated per the statistical form outlined by the CCME (2021).

Reference: Moraine Power Project Air Quality Assessment

Table 7 Maximum Predicted $PM_{2.5}$ Concentrations Associated with Base Case Sensitive Receptors Compared to the CAAQS

Substance	Averaging Period	Predicted Concentration [a]	Background Concentration	Predicted Concentration + Background	CAAQS 2020	CAAQS 2025	% of 2020 CAAQS	% of 2025 CAAQS
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	%	%
Eagle River Casino and Travel Plaza	24-hour	0.097	7.0	7.10	27	-	26	-
	Annual	0.011	2.0	2.01	8.8	-	23	-
Eagle River Tourism RV Park	24-hour	0.057	7.0	7.06	27	-	26	-
	Annual	0.006	2.0	2.01	8.8	-	23	-
Northwest Residential Receptor	24-hour	0.049	7.0	7.05	27	-	26	-
	Annual	0.006	2.0	2.01	8.8	-	23	-
Alberta Highways Hwy 43 Weigh Scale	24-hour	0.125	7.0	7.12	27	-	26	-
	Annual	0.033	2.0	2.03	8.8	-	23	-
Whitecourt Airport	24-hour	0.049	7.0	7.05	27	-	26	-
	Annual	0.008	2.0	2.01	8.8	-	23	-
Southern Residential Area	24-hour	0.045	7.0	7.05	27	-	26	-
	Annual	0.007	2.0	2.01	8.8	-	23	-

NOTES:
BOLD indicates exceedance of the criteria.
[a] Calculated per the statistical form outlined by the CCME (2021).

Table 8 Maximum Predicted SO_2 Concentrations Associated with Base Case Sensitive Receptors Compared to the CAAQS

Substance	Averaging Period	Predicted Concentration [a]	Background Concentration	Predicted Concentration + Background	CAAQS 2020	CAAQS 2025	% of 2020 CAAQS	% of 2025 CAAQS
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	%	%
Eagle River Casino and Travel Plaza	1-hour	0.647	2.2	2.85	183	170	2	2
	Annual	0.004	0.5	0.504	13.1	10.5	4	5
Eagle River Tourism RV Park	1-hour	0.805	2.2	3.00	183	170	2	2
	Annual	0.004	0.5	0.504	13.1	10.5	4	5
Northwest Residential Receptor	1-hour	0.214	2.2	2.41	183	170	1	1
	Annual	0.002	0.5	0.502	13.1	10.5	4	5
Alberta Highways Hwy 43 Weigh Scale	1-hour	0.430	2.2	2.63	183	170	1	2
	Annual	0.013	0.5	0.513	13.1	10.5	4	5
Whitecourt Airport	1-hour	0.446	2.2	2.65	183	170	1	2
	Annual	0.005	0.5	0.505	13.1	10.5	4	5
Southern Residential Area	1-hour	0.514	2.2	2.71	183	170	1	2
	Annual	0.004	0.5	0.504	13.1	10.5	4	5

NOTES:
BOLD indicates exceedance of the criteria.
[a] Calculated per the statistical form outlined by the CCME (2021).

Reference: Moraine Power Project Air Quality Assessment

Table 9 Maximum Predicted Concentrations Associated with Project Alone Case

Substance	Averaging Period	Predicted Concentration	Background Concentration	Predicted Concentration + Background	AAAQO	% of AAAQO
		µg/m³	µg/m³	µg/m³	µg/m³	%
NO_2 (ARM)	1-hour [a]	11.5	35.6	47.1	300	16
	Annual	0.499	9.8	10.3	45	23
$PM_{2.5}$	1-hour [a]	2.87	7	9.9	80	12
	24-hour	1.16	6.6	7.8	29	27
CO	1-hour [a]	14.5	365	380	15,000	3
	8-hour	9.14	364	373	6,000	6
SO_2	1-hour [a]	0.599	2.2	2.80	450	1
	24-hour	0.242	2.0	2.24	125	2
	30-day	0.0691	0.8	0.87	30	3
	Annual	0.0260	0.5	0.53	20	3

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

Reference: Moraine Power Project Air Quality Assessment

Table 10 Maximum Predicted NO_2 Concentrations Associated with Project Alone Case Sensitive Receptors Compared to the CAAQS

Substance	Averaging Period	Predicted Concentration [a]	Background Concentration	Predicted Concentration + Background	CAAQS 2020	CAAQS 2025	% of 2020 CAAQS	% of 2025 CAAQS
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	%	%
Eagle River Casino and Travel Plaza	1-hour	4.84	35.6	40.4	113	79	36	51
	Annual	0.081	9.8	9.9	32	22.6	31	44
Eagle River Tourism RV Park	1-hour	4.43	35.6	40.0	113	79	35	51
	Annual	0.063	9.8	9.9	32	22.6	31	44
Northwest Residential Receptor	1-hour	3.93	35.6	39.5	113	79	35	50
	Annual	0.094	9.8	9.9	32	22.6	31	44
Alberta Highways Hwy 43 Weigh Scale	1-hour	3.75	35.6	39.4	113	79	35	50
	Annual	0.233	9.8	10.0	32	22.6	31	44
Whitecourt Airport	1-hour	1.982	35.6	37.6	113	79	33	48
	Annual	0.029	9.8	9.8	32	22.6	31	43
Southern Residential Area	1-hour	2.04	35.6	37.6	113	79	33	48
	Annual	0.025	9.8	9.8	32	22.6	31	43

NOTES:
BOLD indicates exceedance of the criteria.
[a] Calculated per the statistical form outlined by the CCME (2021).

Reference: Moraine Power Project Air Quality Assessment

Table 11 Maximum Predicted $PM_{2.5}$ Concentrations Associated with Project Alone Case Sensitive Receptors Compared to the CAAQS

Substance	Averaging Period	Predicted Concentration [a]	Background Concentration	Predicted Concentration + Background	CAAQS 2020	CAAQS 2025	% of 2020 CAAQS	% of 2025 CAAQS
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	%	%
Eagle River Casino and Travel Plaza	24-hour	0.153	7.0	7.15	27	-	26	-
	Annual	0.019	2.0	2.02	8.8	-	23	-
Eagle River Tourism RV Park	24-hour	0.116	7.0	7.12	27	-	26	-
	Annual	0.015	2.0	2.02	8.8	-	23	-
Northwest Residential Receptor	24-hour	0.126	7.0	7.13	27	-	26	-
	Annual	0.021	2.0	2.02	8.8	-	23	-
Alberta Highways Hwy 43 Weigh Scale	24-hour	0.235	7.0	7.24	27	-	27	-
	Annual	0.057	2.0	2.06	8.8	-	23	-
Whitecourt Airport	24-hour	0.048	7.0	7.05	27	-	26	-
	Annual	0.007	2.0	2.01	8.8	-	23	-
Southern Residential Area	24-hour	0.041	7.0	7.04	27	-	26	-
	Annual	0.006	2.0	2.01	8.8	-	23	-

NOTES:
BOLD indicates exceedance of the criteria.
[a] Calculated per the statistical form outlined by the CCME (2021).

Table 12 Maximum Predicted SO_2 Concentrations Associated with Project Alone Case Sensitive Receptors Compared to the CAAQS

Substance	Averaging Period	Predicted Concentration [a]	Background Concentration	Predicted Concentration + Background	CAAQS 2020	CAAQS 2025	% of 2020 CAAQS	% of 2025 CAAQS
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	%	%
Eagle River Casino and Travel Plaza	1-hour	0.288	2.2	2.49	183	170	1	1
	Annual	0.004	0.5	0.504	13.1	10.5	4	5
Eagle River Tourism RV Park	1-hour	0.284	2.2	2.48	183	170	1	1
	Annual	0.003	0.5	0.503	13.1	10.5	4	5
Northwest Residential Receptor	1-hour	0.244	2.2	2.44	183	170	1	1
	Annual	0.005	0.5	0.505	13.1	10.5	4	5
Alberta Highways Hwy 43 Weigh Scale	1-hour	0.228	2.2	2.43	183	170	1	1
	Annual	0.012	0.5	0.512	13.1	10.5	4	5
Whitecourt Airport	1-hour	0.153	2.2	2.35	183	170	1	1
	Annual	0.002	0.5	0.502	13.1	10.5	4	5
Southern Residential Area	1-hour	0.153	2.2	2.35	183	170	1	1
	Annual	0.001	0.5	0.501	13.1	10.5	4	5

NOTES:
BOLD indicates exceedance of the criteria.
[a] Calculated per the statistical form outlined by the CCME (2021).

Reference: Moraine Power Project Air Quality Assessment

Table 13 Maximum Predicted Concentrations Associated with Application Case

Substance	Averaging Period	Predicted Concentration	Background Concentration	Predicted Concentration + Background	AAAQO	% of AAAQO	Change from Base Case
		μg/m³	μg/m³	μg/m³	μg/m³	%	%
NO_2 (ARM)	1-hour [a]	146	35.6	181	300	60	0.00
	Annual	26.6	9.8	36.4	45	81	0.26
$PM_{2.5}$	1-hour [a]	6.74	7	13.7	80	17	0.00
	24-hour	2.45	6.6	9.05	29	31	0.00
CO	1-hour [a]	3,998	365	4,363	15,000	29	0.00
	8-hour	2,746	364	3,110	6,000	52	0.11
SO_2	1-hour [a]	1.91	2.2	4.11	450	1	0.00
	24-hour	0.561	2.0	2.56	125	2	0.00
	30-day	0.242	0.8	1.04	30	3	0.00
	Annual	0.139	0.5	0.639	20	3	3.16

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

Table 14 Maximum Predicted NO_2 Concentrations Associated with Application Case Sensitive Receptors Compared to the CAAQS

Substance	Averaging Period	Predicted Concentration [a]	Background Concentration	Predicted Concentration + Background	CAAQS 2020	CAAQS 2025	% of 2020 CAAQS	% of 2025 CAAQS	Change from Base Case
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	%	%	%
Eagle River Casino and Travel Plaza	1-hour	93.2	35.6	**129**	113	79	**114**	**163**	0.00
	Annual	0.914	9.8	10.7	32	22.6	33	47	9.3
Eagle River Tourism RV Park	1-hour	57.8	35.6	**93.4**	113	79	83	**118**	0.11
	Annual	0.564	9.8	10.4	32	22.6	32	46	12.6
Northwest Residential Receptor	1-hour	66.0	35.6	**102**	113	79	90	**129**	0.03
	Annual	0.631	9.8	10.4	32	22.6	33	46	15.6
Alberta Highways Hwy 43 Weigh Scale	1-hour	53.6	35.6	**89.2**	113	79	79	**113**	0.00
	Annual	2.59	9.8	12.4	32	22.6	39	55	9.7
Whitecourt Airport	1-hour	39.5	35.6	75.1	113	79	66	95	0.01
	Annual	0.660	9.8	10.5	32	22.6	33	46	4.6
Southern Residential Area	1-hour	41.8	35.6	77.4	113	79	69	98	0.39
	Annual	0.593	9.8	10.4	32	22.6	32	46	3.4

NOTES:
BOLD indicates exceedance of the criteria.
[a] Calculated per the statistical form outlined by the CCME (2021).

Table 15 Maximum Predicted $PM_{2.5}$ Concentrations Associated with Application Case Sensitive Receptors Compared to the CAAQS

Substance	Averaging Period	Predicted Concentration [a]	Background Concentration	Predicted Concentration + Background	CAAQS 2020	CAAQS 2025	% of 2020 CAAQS	% of 2025 CAAQS	Change from Base Case
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	%	%	%
Eagle River Casino and Travel Plaza	24-hour	0.188	7.0	7.19	27	-	27	-	93.9
	Annual	0.031	2.0	2.03	8.8	-	23	-	174
Eagle River Tourism RV Park	24-hour	0.139	7.0	7.14	27	-	26	-	145
	Annual	0.021	2.0	2.02	8.8	-	23	-	253
Northwest Residential Receptor	24-hour	0.153	7.0	7.15	27	-	26	-	211
	Annual	0.027	2.0	2.03	8.8	-	23	-	344
Alberta Highways Hwy 43 Weigh Scale	24-hour	0.268	7.0	7.27	27	-	27	-	115
	Annual	0.089	2.0	2.09	8.8	-	24	-	169
Whitecourt Airport	24-hour	0.079	7.0	7.08	27	-	26	-	60.0
	Annual	0.014	2.0	2.01	8.8	-	23	-	85.9
Southern Residential Area	24-hour	0.071	7.0	7.07	27	-	26	-	56.2
	Annual	0.013	2.0	2.01	8.8	-	23	-	74.0

NOTES:
BOLD indicates exceedance of the criteria.
[a] Calculated per the statistical form outlined by the CCME (2021).

Reference: Moraine Power Project Air Quality Assessment

Table 16 Maximum Predicted SO_2 Concentrations Associated with Application Case Sensitive Receptors Compared to the CAAQS

Substance	Averaging Period	Predicted Concentration [a]	Background Concentration	Predicted Concentration + Background	CAAQS 2020	CAAQS 2025	% of 2020 CAAQS	% of 2025 CAAQS	Change from Base Case
		μg/m³	μg/m³	μg/m³	μg/m³	μg/m³	%	%	%
Eagle River Casino and Travel Plaza	1-hour	0.647	2.2	2.85	183	170	2	2	0.00
	Annual	0.008	0.5	0.508	13.1	10.5	4	5	92.0
Eagle River Tourism RV Park	1-hour	0.818	2.2	3.02	183	170	2	2	1.7
	Annual	0.007	0.5	0.507	13.1	10.5	4	5	81.8
Northwest Residential Receptor	1-hour	0.342	2.2	2.54	183	170	1	1	59.6
	Annual	0.007	0.5	0.507	13.1	10.5	4	5	272
Alberta Highways Hwy 43 Weigh Scale	1-hour	0.435	2.2	2.64	183	170	1	2	1.1
	Annual	0.025	0.5	0.525	13.1	10.5	4	5	90.9
Whitecourt Airport	1-hour	0.448	2.2	2.65	183	170	1	2	0.55
	Annual	0.006	0.5	0.506	13.1	10.5	4	5	32.1
Southern Residential Area	1-hour	0.519	2.2	2.72	183	170	1	2	0.96
	Annual	0.005	0.5	0.505	13.1	10.5	4	5	23.5

NOTES:
BOLD indicates exceedance of the criteria.
[a] Calculated per the statistical form outlined by the CCME (2021).

Reference: Moraine Power Project Air Quality Assessment

6 Conclusion

The maximum predicted NO_2, $PM_{2.5}$, CO, and SO_2 concentrations associated with the Base Case, Project Alone Case, and Application Case are less than the relevant AAAQOs. The maximum predicted NO_2, $PM_{2.5}$, and SO_2 concentrations at sensitive receptors associated with the Project Alone Case are less than the relevant CAAQS. The maximum predicted $PM_{2.5}$ and SO_2 concentrations at sensitive receptors associated with the Base Case, and Application case are less than the relevant CAAQS; however, the maximum predicted 1-hour NO_2 concentrations at sensitive receptors associated with the Base Case and Application Case are greater than the relevant CAAQS. The predicted exceedance of the 1-hour CAAQS for NO_2 in the Base Case and Application Case is attributable to emissions from the ANC facility. The NO_2 model predictions greater than the CAAQS are expected to be conservative as actual emissions from the ANC are typically less than 50% of the maximum approved emission limit rate employed in dispersion

Regards,

STANTEC CONSULTING LTD.
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Reid Allan Person -- P. Eng. - APEG/

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Senior Air Quality Engineer, Principal
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Attachment: Attachment A – Figures, Attachment B – Regional Emissions

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RM APEGA ID #: 113862
DATE: September 1 2023
PERMIT NUMBER: P000258
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

References

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AEP. 2021. Air Quality Modelling Guideline. Alberta Environment and Parks. Edmonton, Alberta. September 2021.

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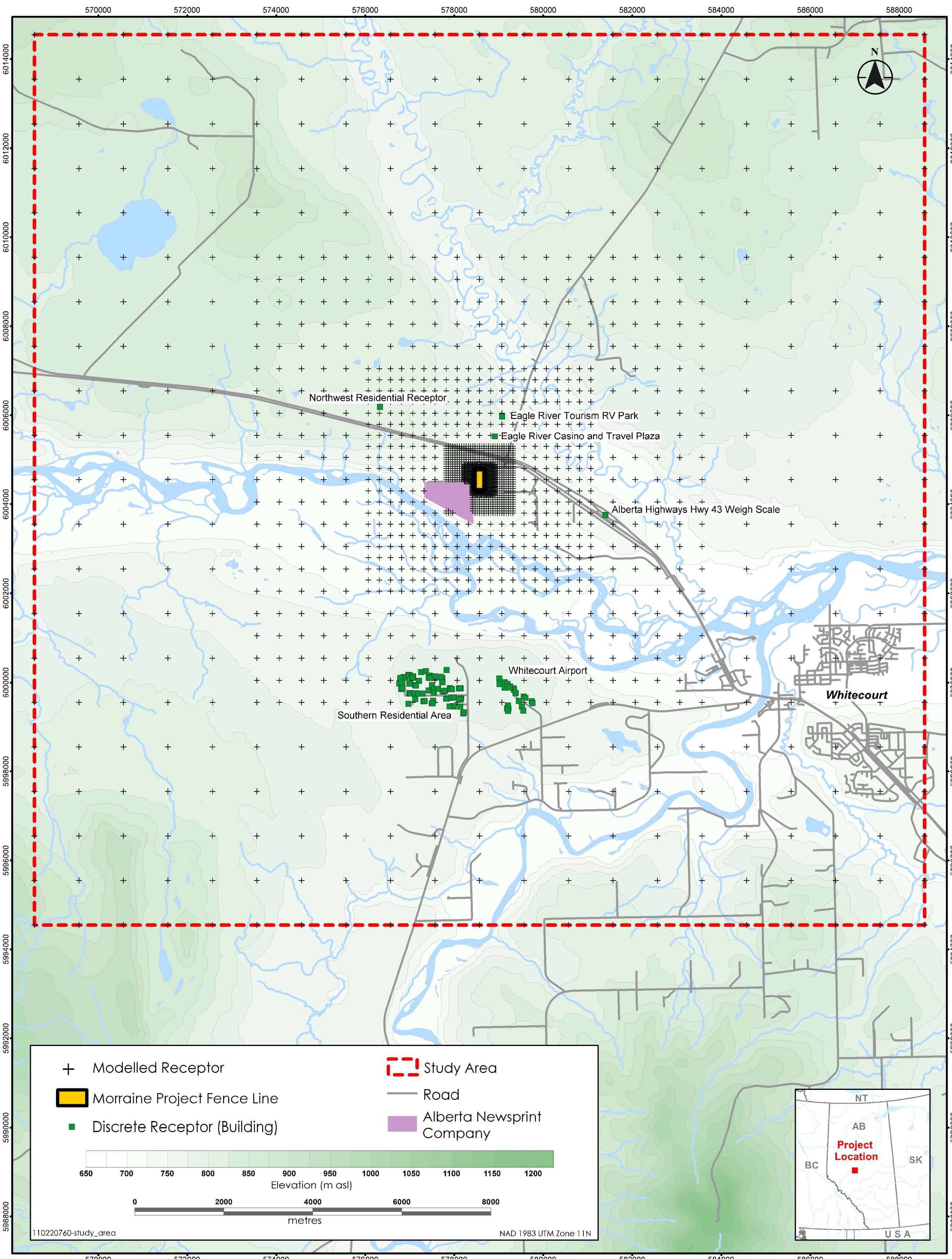
Attachment A - Figures



Sources: Base Data - Natural Resources Canada; Thematic Data - Stantec, Moraine Initiatives Limited

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Study Area

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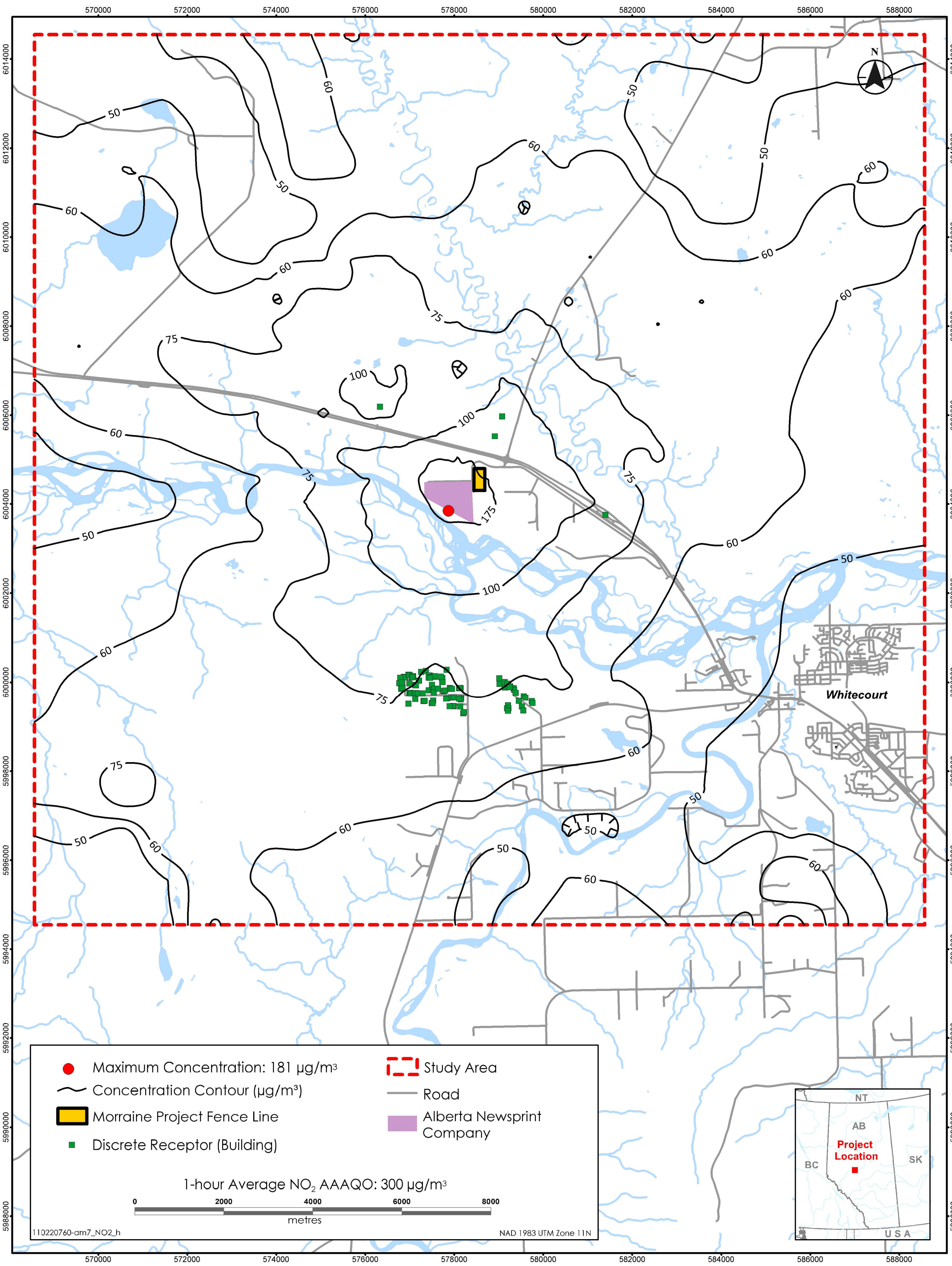
GE MORAINE PROJECT

Figure 1



Sources: Base Data - Natural Resources Canada; Thematic Data - Stantec, Moraine Initiatives Limited

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

1-hour NO_2 Concentrations (Base Case)

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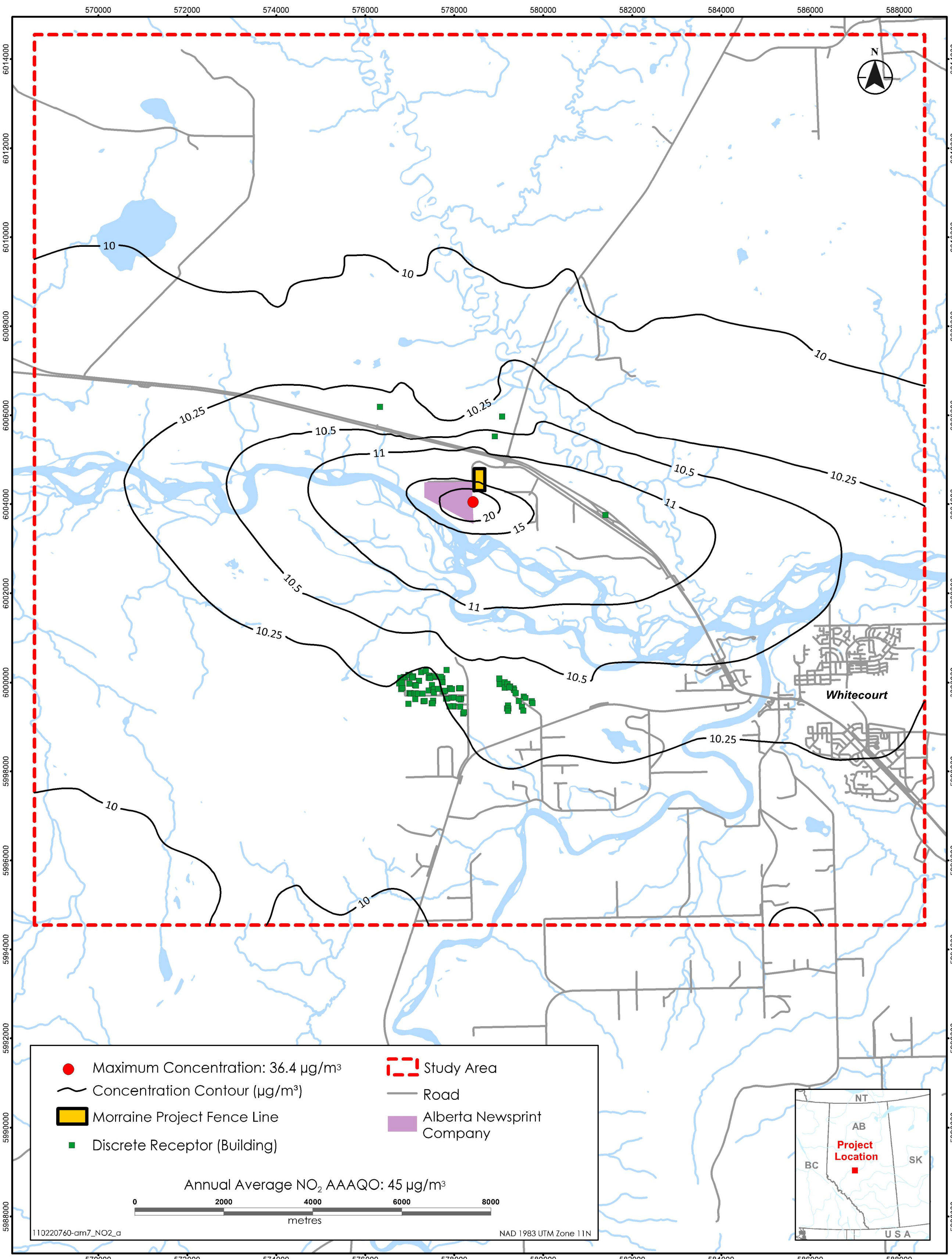
GE MORAINE PROJECT

Figure A.1



Sources: Base Data - Natural Resources Canada; Thematic Data - Stantec, Moraine Initiatives Limited

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Annual NO_2 Concentrations (Base Case)

Stantec

GE MORAINE PROJECT

Figure A.2

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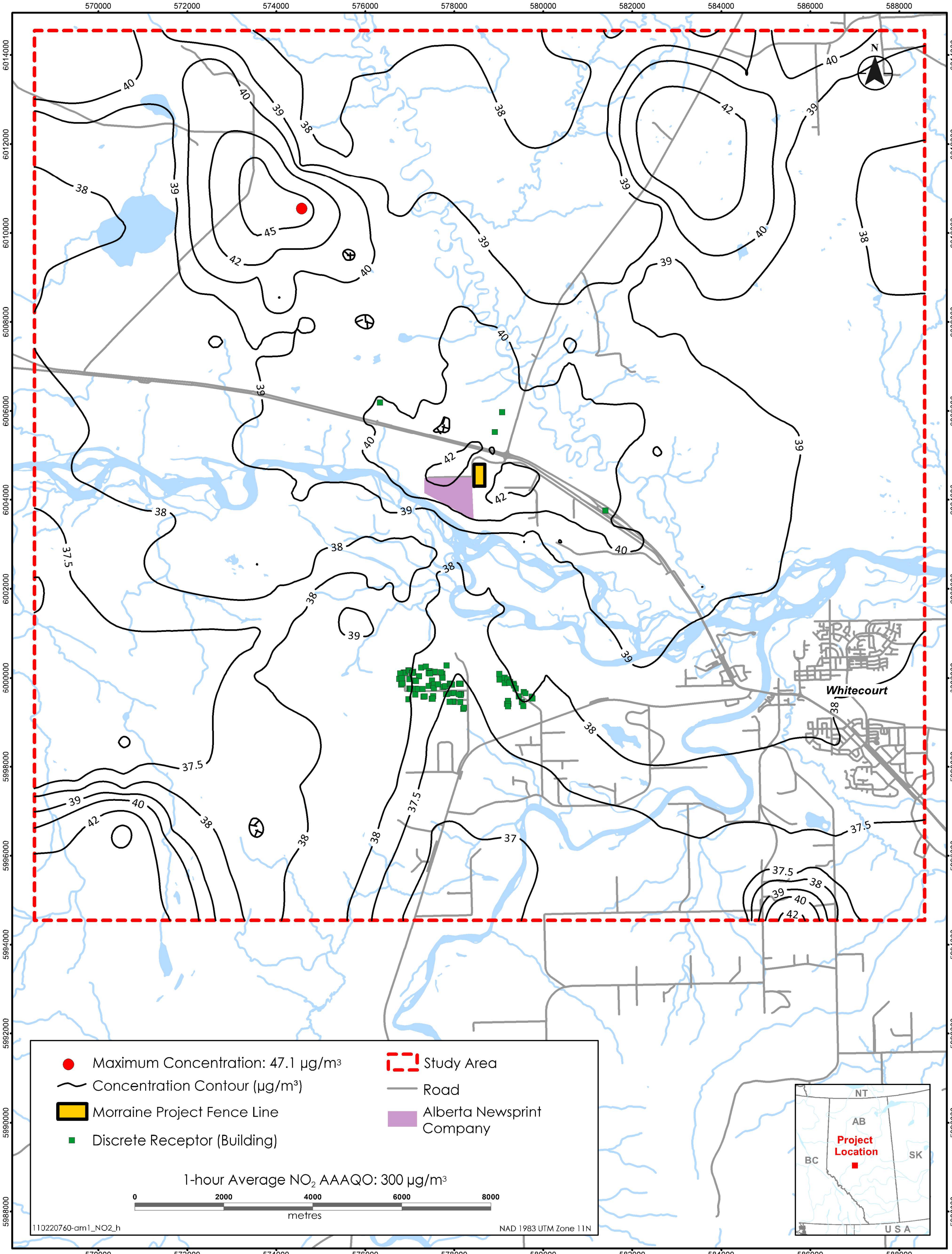

Sources: Base Data - Natural Resources Canada; Thematic Data - Stantec, Moraine Initiatives Limited

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

1-hour NO_2 Concentrations (Project Alone Case)

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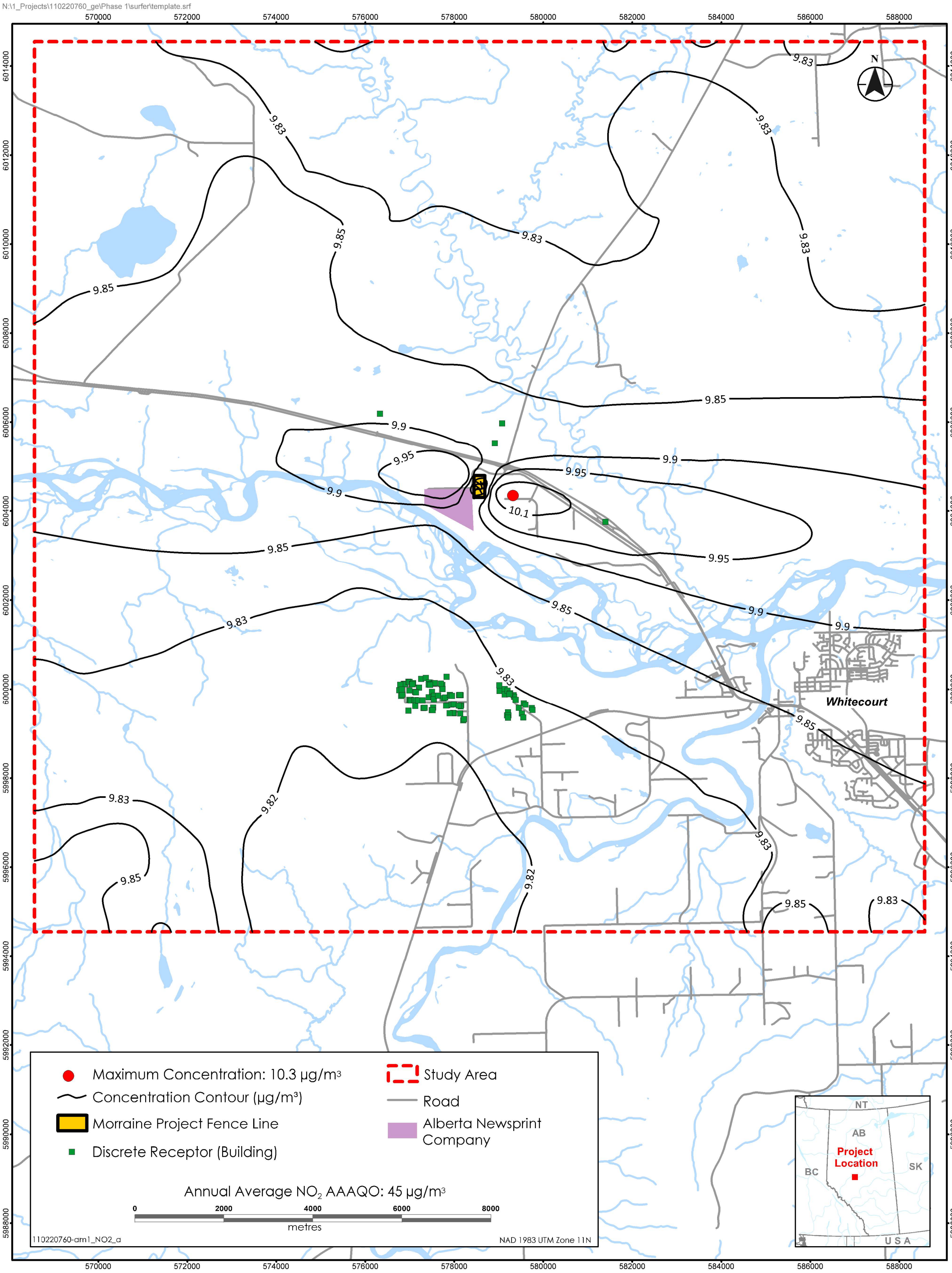
Figure A.3

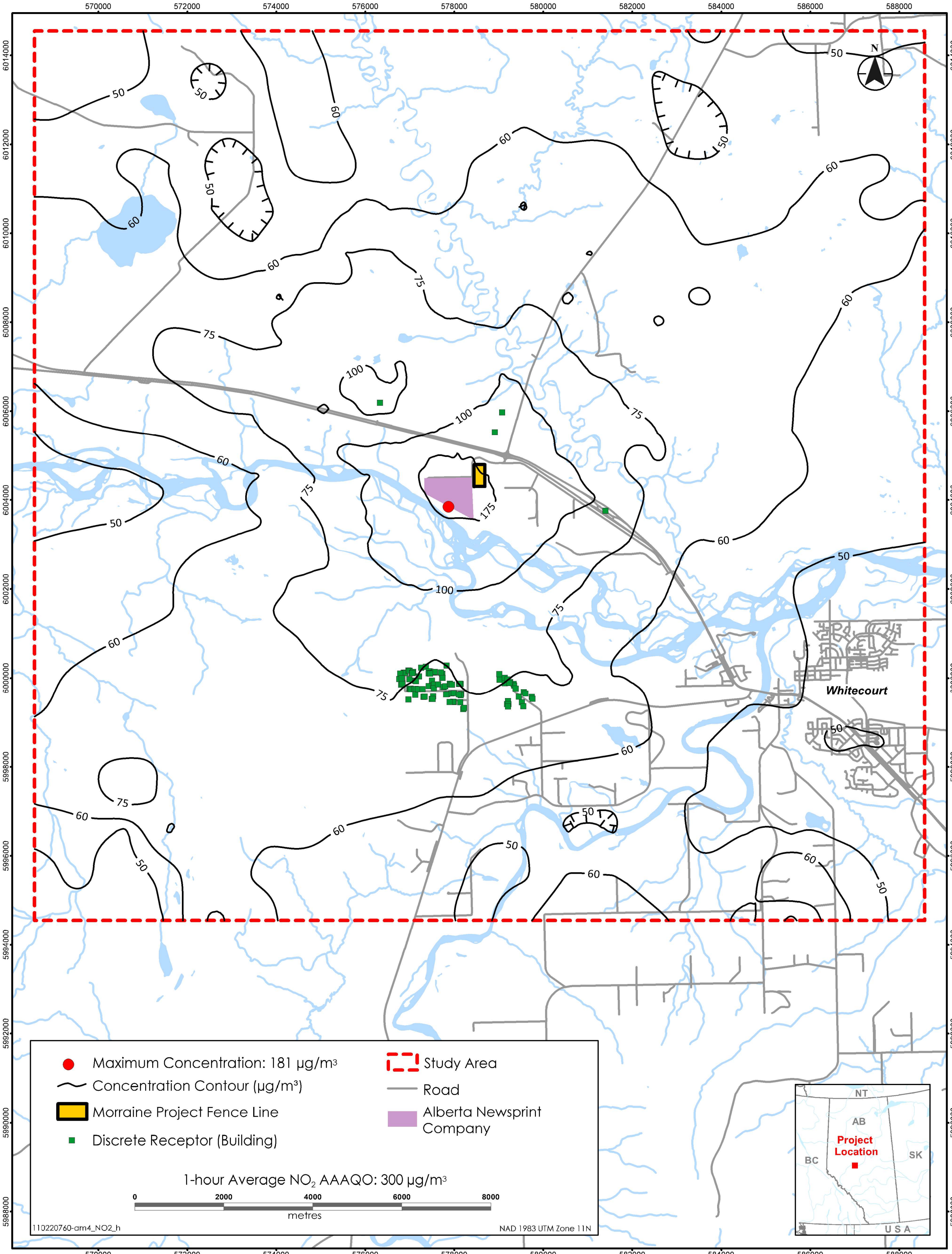


Annual NO_2 Concentrations (Project Alone Case)

Stantec

GE MORAINE PROJECT

Figure A.4



Sources: Base Data - Natural Resources Canada; Thematic Data - Stantec, Moraine Initiatives Limited

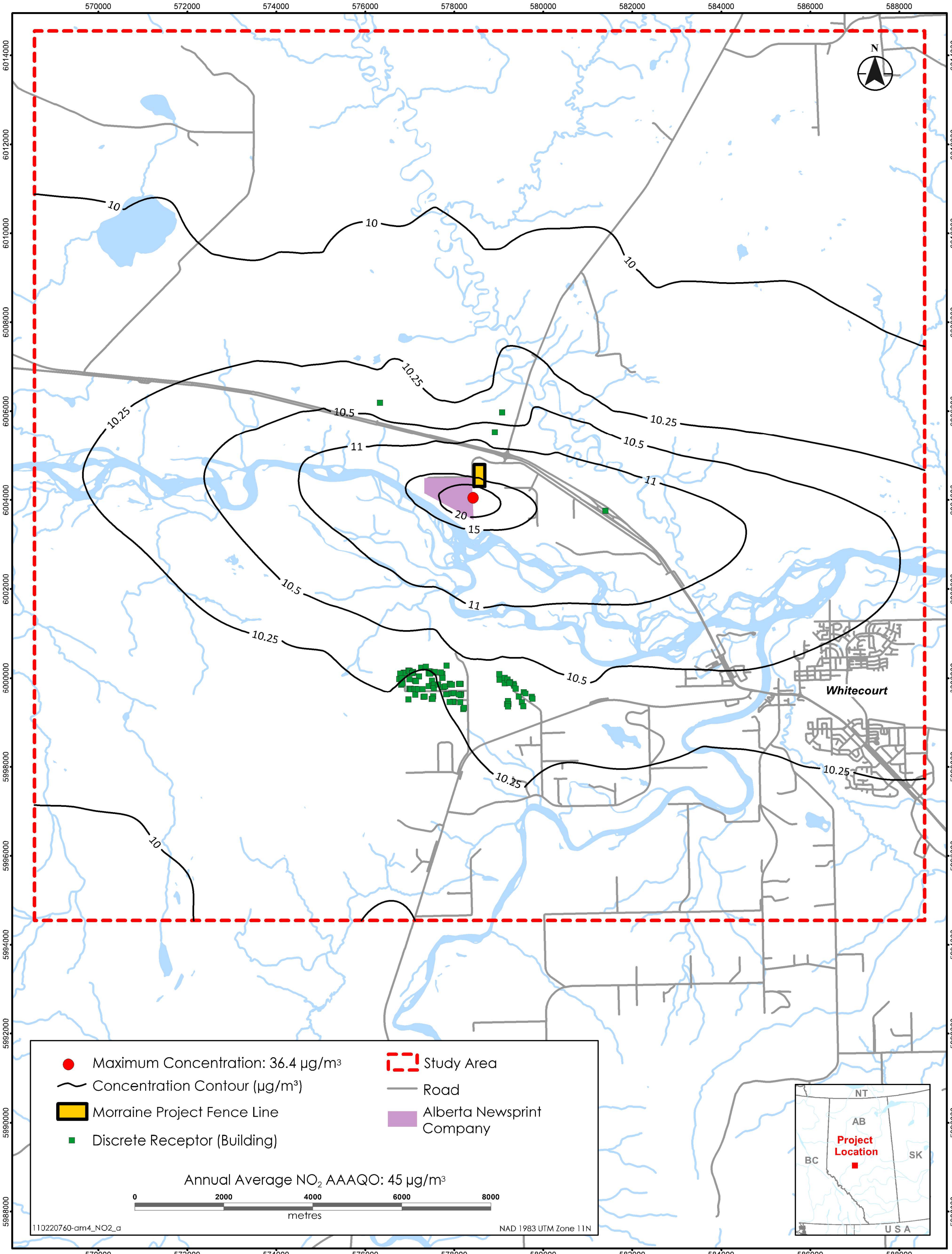
Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

1-hour NO_2 Concentrations (Application Case)

Stantec

GE MORAINE PROJECT

Figure A.5



Sources: Base Data - Natural Resources Canada; Thematic Data - Stantec, Moraine Initiatives Limited

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.

Annual NO_2 Concentrations (Application Case)

Stantec

GE MORAINE PROJECT

Figure A.6

Reference: **Moraine Power Project Air Quality Assessment**

Attachment B - Regional Emissions

Table B.1 Emission Rates and Parameters for Regional Sources (Alberta Newsprint Company Facility)

Model Source ID	Equipment Type	Easting (m)	Northing (m)	Elevation (m)	Stack Height (m)	Diameter (m)	Velocity (m/s)	Temperature (K)	NO_X (kg/h)	SO_2 (kg/h)	$PM_{2.5}$ (kg/h)	CO (kg/h)
RP1	Caterpillar G16CM34 Generator 1	577638	6004127	738	20.0	1.07	24.6	622	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP2	Caterpillar G16CM34 Generator 2	577642	6004126	738	20.0	1.07	27.6	627	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP3	Caterpillar G16CM34 Generator 3	577642	6004123	738	20.0	1.07	27.4	633	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP4	Caterpillar G16CM34 Generator 4	577638	6004122	738	20.0	1.07	26.2	622	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP5	Caterpillar G16CM34 Generator 5	577636	6004099	737	20.0	1.07	16.9	706	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP6	Caterpillar G16CM34 Generator 6	577638	6004099	737	20.0	1.07	26.9	627	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP7	Caterpillar G16CM34 Generator 7	577641	6004098	737	20.0	1.07	26.1	618	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP8	Caterpillar G16CM34 Generator 8	577641	6004095	737	20.0	1.07	23.7	623	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP9	Caterpillar G16CM34 Generator 9	577638	6004094	737	20.0	1.07	25.4	628	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP10	Caterpillar G16CM34 Generator 10	577636	6004094	737	20.0	1.07	25.1	640	1.98E+00	1.76E-04	2.36E-02	1.71E+02
RP11	Combine Boiler	577880	6004113	732	33.8	2.32	5.1	428	1.41E+01	9.60E-03	9.57E-02	1.30E-01
RP12	Sulphur Dioxide Vent Stack	577831	6004207	738	17.4	0.90	7.8	297	0.00E+00	1.36E-01	0.00E+00	0.00E+00

Appendix E Draft Stormwater Management Concept Plan

Moraine Power Generation Project - Stormwater Management Concept Plan

Draft Report

Report Date

August 28, 2023

Prepared for:

Moraine Initiatives Limited (MIL)
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Prepared by:

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10160 – 112 Street
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Revision	Description	Author	Quality Check	Independent Review
0	Issued for Review	AN/RI	FK	DK

The conclusions in the Report titled Moraine Power Generation Project - Stormwater Management Concept Plan are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

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Cathy Kingdon, MES, P.Eng.

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1.0 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

Moraine Initiatives Limited (MIL) retained Stantec Consulting Ltd. (Stantec) to develop a concept level stormwater management plan for the proposed Moraine Power Generation Project to be located northwest of Whitecourt in the SE quarter-section of 18-60-12-W5M within a former gravel pit site. As shown on **Figure 1**, the site is located in the Woodlands County jurisdiction and bounded by:

- Township Road 602A to the west
- Treed area, Township Road 602A and Highway 43 to the north
- Gravel pit to the east
- CN Rail Line to the south

The purpose of this study is to identify stormwater management requirements for the proposed natural gas-fueled power generation facility (PGF), consisting of combined cycle gas turbine (CCGT) electricity generation equipped with a post-combustion integrated carbon dioxide (CO_2) capture facility (ICCF). The stormwater management for the proposed PGF will require a stormwater management facility (SWMF), on-site grading and conveyance system and an outlet system to convey the discharge to a natural water course or an appropriate off-site outlet location. Due to the industrial nature of the proposed development, the stormwater runoff from the site will be required to be contained and released after water quality testing requirements have been met, and at a controlled release rate depending on the natural water course/outlet system capacity. Specific study objectives are:

- To assess the impact of off-site drainage on the proposed development and identify measures to address the off-site runoff
- To determine the required size of the SWMF and an outlet system
- To determine the allowable discharge rate from the SWMF and identify potential outlet locations from the site

1.2 DESIGN BASIS

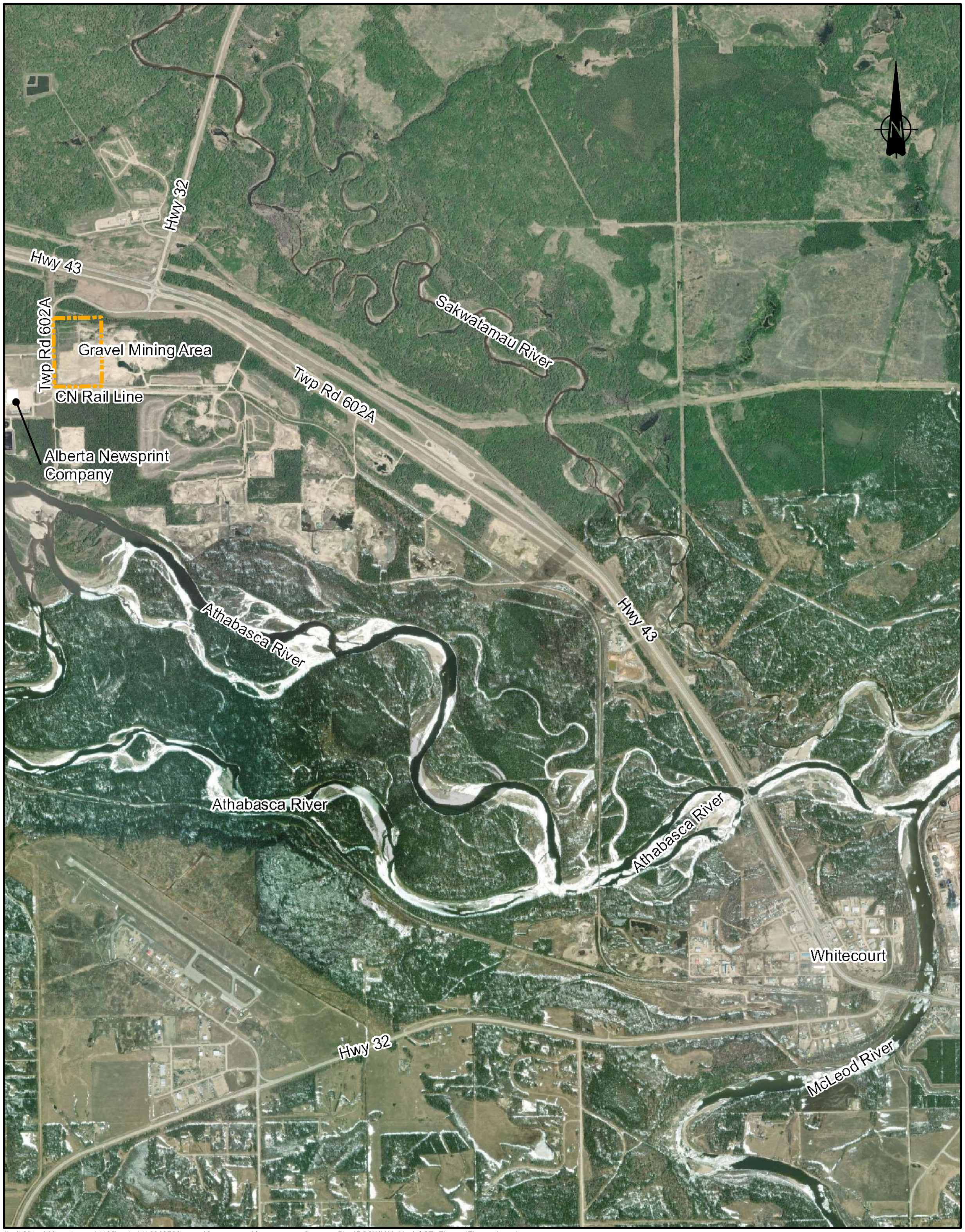
The following design requirements have been established based on the Woodlands County Design Guidelines & Construction Standards (July 2016), Alberta Environment Guide to Content for Industrial Approval Applications (August 2013) and best engineering practices for the development of the proposed stormwater management plan:

- The post-development discharge from the site is to be equal to or less than the pre-development flowrates for the 5-, 25- and 100-year return period rainfall events
- The SWMF to have adequate capacity to store runoff from the 1 in 100-year 24-hr rainfall event
- The SWMF to retain 85% of particles coarser than 75 microns

1.3 REPORT ORGANIZATION

This report is organized as follows:

- Section 2 provides information collected and reviewed, site description, topography, existing drainage patterns and land uses
- Section 3 describes the stormwater model developed for this study
- Section 4 describes the proposed stormwater management plan including SWMF storage requirements, allowable discharge rates, potential outlet discharge locations and water quality improvement strategies
- Section 5 provides conclusions and recommendations



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Revised: 2023-08-28 By: abnabi

August 2023
Project No.110220760

Stantec

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Edmonton AB
www.stantec.com

Legend

Project Site Boundary

Client/Project

Moraine Initiatives Limited

Moraine Power Generation Project

Stormwater Management Plan

Figure No.

1.0

Title

Project Location Plan

2.0 SITE DESCRIPTION AND INFORMATION REVIEW

2.1 DATA COLLECTION AND INFORMATION REVIEW

A list of data and information that were collected and reviewed is provided below:

- LiDAR information (surveyed 2019/2020)
- Aerial imagery
- Information collected during a site visit on July 26, 2023
- Woodlands County Design Guidelines and Construction Standards (July 2016)
- Alberta Environment Guide to Content for Industrial Approval Applications (August 2013)
- Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems – Part 5 Stormwater Management Guidelines (March 2013
- Alberta Environment Municipal Policies and Procedures Manual (April 2001)
- Alberta Environment Stormwater Management Guidelines (January 1999)
- Phase I Environmental Site Assessment by Stantec Consulting Ltd. (December 2022)
- Phase II Environmental Site Assessment by Stantec Consulting Ltd. (January 2023)
- Whitecourt Pit Audit 2020 by Lehigh Hanson (September 2020)

Relevant information from the above has been used to understand and develop the project requirements as discussed in subsequent sections.

2.2 EXISTING DEVELOPMENT, TOPOGRAPHY AND DRAINAGE

A significant portion of the study area was formerly used for gravel mining and as shown on **Figure 2**, the gravel pit extends east of the PGF boundary and will likely remain active for the foreseeable future. The PGF is bound by the CN Rail Line to the south and Highway 43 and Township Road 602A to the north. Township Road 602A also bounds the study area to the west, with the Alberta Newsprint Company located west of Township Road 602A. Several other gravel pits are located to the south and east of the study area between Highway 43 and the Athabasca River. The Sakwatamau River runs north of Highway 43 and has its confluence with the Athabasca River and the McLeod River northwest of the Town of Whitecourt.

The northwest portion of the site, approximately 7.72 ha, is vegetated including some trees while the remaining 10.80 ha area is located within the existing gravel pit which is approximately 6 to 7 m lower than the surrounding unmined areas. The highest elevation within the study area is on the southwest berm at approximately 736.4 m and the lowest elevation is along the east edge at approximately 723.8 m. A localized high ground elevation of approximately 736.7 m is located within the study area on a gravel pile located in southeast corner of the site. **Figure 2** and **Figure 3** show the existing topography of the site.

The existing gravel pit drainage is self-contained with only minor offsite drainage contribution coming to the gravel pit. However, a pair of 750 mm diameter culverts located near the northwest corner of the study area, across Township Road 602A, convey offsite runoff east through the treed area north of the site. Approximately 1.24 ha of offsite vegetated area drains to a 1 m deep low spot located on the western boundary of the site. Similar low spots were identified on CN Rail's ditch outside the south property boundary.

The gravel pit portion of the site drains to the east into a dugout located within the gravel pit area. The north vegetated unmined portion of the site drains northeast to an existing drainage channel that conveys runoff east to a 600 mm culvert under a gravel road. The existing culverts on Township Road 602A also discharge to this natural drainage channel. This drainage channel then conveys runoff to a 1,500 mm diameter culvert under the CN Rail Line and then drains south to an existing gravel pit south of the CN Rail Line. Due to access limitations during the site visit, it was not possible to determine whether the accumulated runoff in the gravel pit infiltrates into the ground or is conveyed to the Athabasca River through the ditch/culvert system. Although the existing gravel pits are operated by private business entities, it is understood that this overland drainage route lies within the Crown owned lands.

The generalized stratigraphy encountered in the monitoring wells and boreholes drilled for the Phase II Environmental Site Assessment generally consists of gravel with trace sand at eight boreholes or monitoring wells and sand with some gravel at one monitoring well, underlain by clay with trace silt and gravel, or medium to fine-grained sand at two boreholes, and coarse-grained sand at one monitoring well. Due to the granular nature of the subsurface soil material within and surrounding the study area, surface runoff water is generally infiltrated and conveyed to natural water courses as groundwater.

Within the site, there are currently four sub-catchments with distinct discharge locations as summarized in **Table 1**. The extent of the study area, the existing drainage patterns and existing culverts are shown on **Figure 4**.

Table 1: Study Area Pre-Development Drainage

Sub-Catchments and Drainage direction	Pre-Development Drainage Area (ha)
1E: Drains northeast to the natural drainage channel	1.78
2E: Drains to a 1m deep low spot located near the western boundary of the site	2.88
3E: Drains east to a dugout located inside the gravel pit area	13.25
4E: Drains to the existing CN Rail ditch located outside the south boundary of the site	0.61
Offsite: Drains to a 1m deep low spot located near the western boundary of the site	1.24
Total	**19.76**

2.3 PROPOSED LAND USE

The proposed development includes natural gas-fueled PGF, CCGT electricity generation equipped with a post-combustion integrated CO_2 capture facility (ICCF). In addition, a 240 kV transmission line, a CO_2 pipeline and a natural gas pipeline will be constructed to facilitate electricity generation and transmission.

The PGF will include a number of related components such as an air cooled condenser, heat exchanger, CO_2 absorber, CO_2 compression and dehydration unit, combustion turbine building, control and warehouse building, water tanks, parking lot, pump house, steam turbine building and a SWMF. It is our understanding that the site will primarily be surfaced using compacted gravel with some impervious areas from buildings and facility components.

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Project Site Boundary

Contours

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Moraine Initiatives Limited

Moraine Power Generation Project

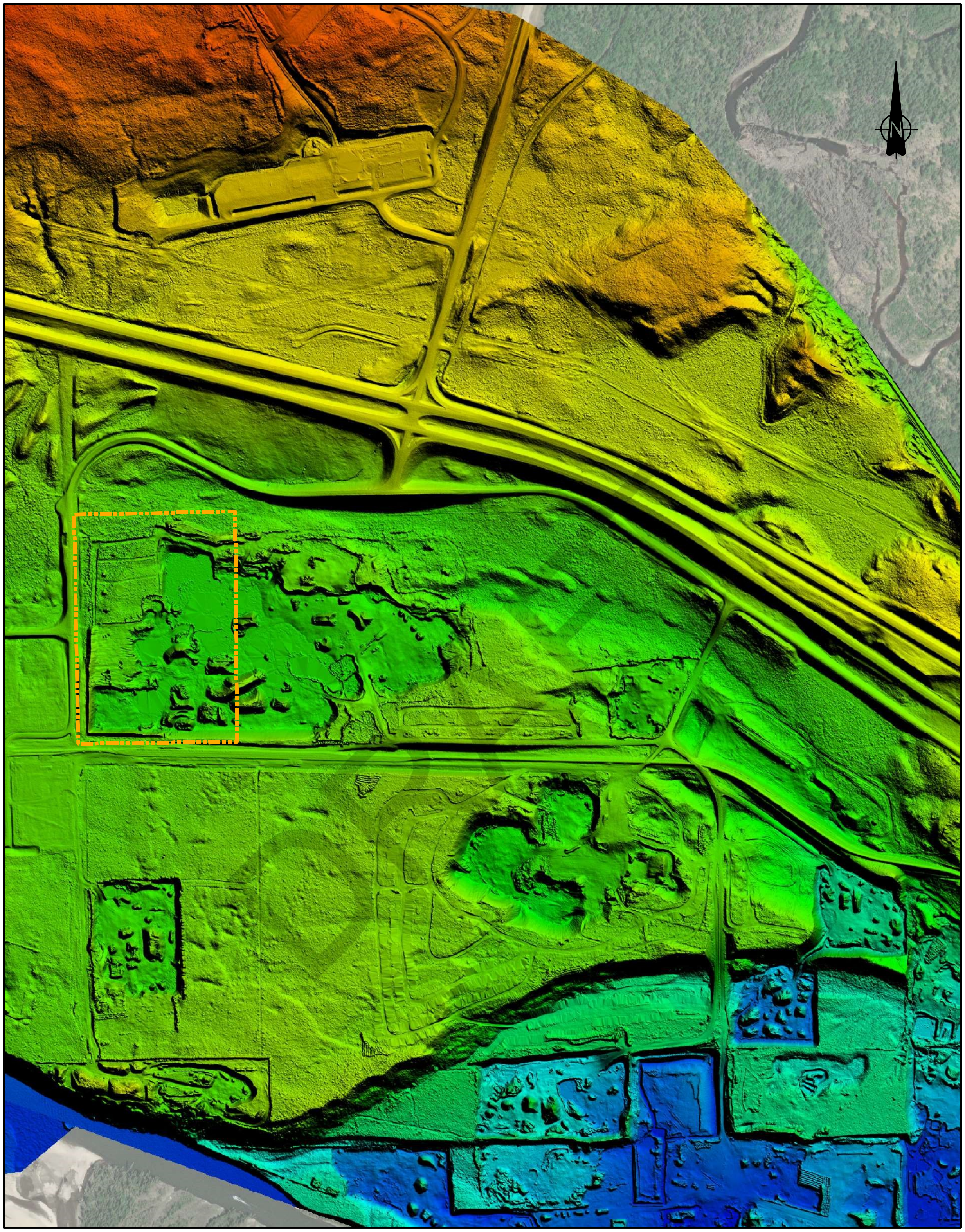
Stormwater Management Plan

Figure No.

2.0

Title

Existing Topography



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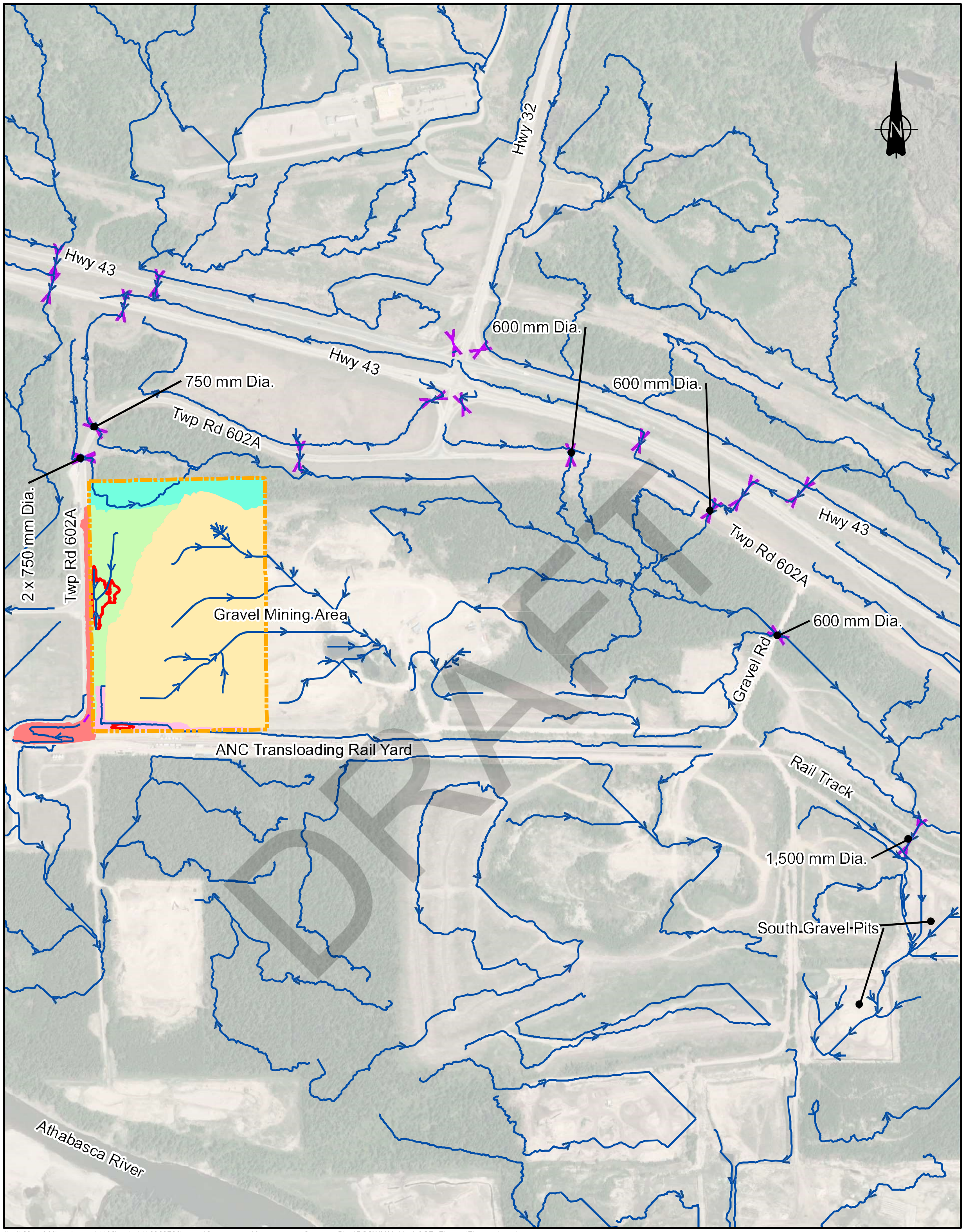
Stormwater Management Plan

Figure No.

3.0

Title

Existing Topography
Hillshade View



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Legend

- Project Site Boundary
- Overland Drainage Path
- Low Spot
- Existing Culverts

Pre-Dev Subcatchments

- 1E
- 2E
- 3E
- 4E
- Offsite

Client/Project
Moraine Initiatives Limited

Moraine Power Generation Project

Stormwater Management Plan

Figure No.
4.0

Title
Existing Drainage Pattern

3.0 STORMWATER MODEL DESCRIPTION

The stormwater computational model, PCSWMM (version 7.4), was used to develop the site-wide stormwater management plan. PCSWMM is a Geographic Information System (GIS) enabled modelling package that provides opportunity to run hydrology, hydraulics, groundwater and surface water quality modelling in the same platform. It runs the EPA-SWMM engine in the background and its integrated GIS tool helps to delineate catchments and create cross-sections of a ditch/channel from a digital elevation model (DEM) attached to the model.

The GIS tool in PCSWMM was utilized to delineate catchments for the site outlets and to create cross-sections of the existing ditches using the DEM feature. The Intensity Duration Frequency (IDF) curve of a nearby rain gauge at the Whitecourt Airport, AB for the period from 1982 to 2006 (24 years) was applied for creating the design rainfall events. Three rainfall frequencies with 24-hour duration were utilized in the assessment: 1 in 5-year, 1 in 25-year and 1 in 100-year. The total rainfall depths for these rainfall events are 61.9 mm, 88.2 mm and 109.9 mm, respectively.

For hydrologic computations, the 'Kinematic Model' was used that applies rainfall to a catchment and then applies infiltration and evaporation losses to compute the surface runoff. The model generates runoff hydrographs in each subcatchment using the Kinematic equation. The runoff computation process considers catchment geometry, slope, surface roughness and other factors. The hydraulic module of PCSWMM uses the Saint-Venant equation to route a hydrograph through a linear conveyance system.

Infiltration was modelled using Natural Resources Conservation Service (NRCS)'s Curve Number method. The Curve Number is a parameterization of soil infiltration properties that considers the effect of both land use and soil type. NRCS has developed Curve Numbers for 49 different land uses, each divided into four different soil types.

Several boreholes and monitoring wells were drilled within the project boundary for the "Phase II Environmental Site Assessment" completed by Stantec in January 2023. These boreholes and monitoring wells were drilled to a depth of 5.0 m below the existing mined surfaces. Most boreholes showed layers of gravels to the 5.0m depth of drilling and monitoring wells showed the groundwater table within 2.0 to 3.0m below the existing mined surfaces. Because of the granular sub-surface material, Curve Numbers were selected based on Hydrologic Soil Group B which is representative of sandy-gravel surfaces. The selected Curve Number for different land uses and derived runoff coefficients for the 1 in 100-year 24-hour rainfall event are summarized in **Table 2**.

Table 2: Land Use and Hydrologic Parameters

Land Use	Curve Number	Imperviousness (%)	Surface Roughness	Derived Runoff Coefficient[1]
Forest/Grassed	60	2	0.17	0.24
Gravel (Compacted)	85	5	0.024	0.68
Building/Asphalt	-	100	0.013	0.98

Note: Runoff coefficients are computed for a 1 in 100-year 24-hour duration rainfall event (rainfall depth 109.9 mm)

4.0 STORMWATER MANAGEMENT PLAN

4.1 DRAINAGE STRATEGY AND POTENTIAL SWMF LOCATIONS

The purpose of the stormwater management plan (SWMP) is to prevent onsite flooding that results in safety and property damage issues as well as to prevent offsite property flooding and erosion to the downstream natural conveyance system. In this study, the onsite stormwater management includes offsite flow diversion and onsite runoff storage that will be required to address the proposed development regulatory approval requirements. The onsite grading, conveyance system and the proposed SWMF configuration will need to be designed during subsequent design stages. For downstream conveyance system protection, the stormwater discharge from the proposed development is matched to the pre-development flow rate from the site. The proposed SWMP is intended to protect the downstream natural water course to avoid adverse impacts from the proposed development. To achieve this, the runoff from the site will be routed to the proposed SWMF and then be released to the north natural drainage course at a pre-development rate after testing for water quality if applicable. The post-development SWMP is shown on **Figure 5**.

The proposed SWMP also consists of a diversion ditch at the northwest corner of the site to intercept the off-site drainage and convey it to the natural drainage channel north of the site. A minor low spot is located near the central west boundary of the study area which also receives some offsite flow from the area near the southwest corner of the site. The low spot area needs to be graded to drain into the proposed SWMF during the design. For the purpose of this preliminary analysis, it is assumed the southwest offsite area (approximately 1.24 ha) will also drain into the proposed SWMF. During detailed design this offsite area can be further investigated to see if it can be redirect to the southwest, if feasible.

A significant portion of the site is a former gravel pit which is approximately 6 to 7 m lower than the adjacent unmined areas. It is understood that the overall site area will likely be graded and built up to a relatively flat surface to accommodate the proposed development.

As the overall site development plan has not been completed yet, the required SWMF can be located in the northeast corner of the study area to provide storage for the 1:100-year 24-hour rainfall event. Drainage ditches and culverts will need to be provided to convey the onsite runoff to the SWMF. Depending on the site grading, a pump station will likely be required to discharge the water from the SWMF to the natural drainage channel north of the site. The pump discharge rate from the SWMF should be limited to the pre-development flow rate from the 1:5 year 24-hour rainfall event.

The north drainage channel flows east conveying the flow through a 600 mm diameter culvert under the gravel road and another 1,500 mm diameter culvert under the CN Rail Line. Downstream of the 1,500 mm diameter culvert, the flow appears to be routed through existing gravel pits eventually draining towards the Athabasca River. The north drainage channel appears to have some depressed areas before the 600 mm diameter culvert which will limit flows going through the 1,500 mm diameter and the existing gravel pits. Beside the proposed development site, approximately 300 ha area, including a portion Highway 43, also drains through the north drainage channel. The drainage area increases to approximately 500 ha at the 1,500 mm diameter culvert. Due to site access limitations during the site visit, the drainage channel downstream of the 1,500 mm diameter culvert under the CN Rail could not be observed to see if it was blocked from gravel mining activities in the area prior to reaching the Athabasca River.

4.2 RELEASE RATES AND STORAGE VOLUMES

The pre-development flow rates were evaluated using the PCSWMM hydrologic model for the 5-year, 25-year and 100-year 24-hour rainfalls events. A summary of the hydrologic analysis for the pre-development condition are summarized in **Table 3.** This hydrologic analysis results are based on pre-mining vegetated/forested conditions for the study area. For this pre-development condition, a Curve Number of 60 was considered representative of pre-development condition.

Table 3: Pre-Development Flow Rates and Runoff Volumes

Rainfall Events	Area (ha)	Rainfall Depth (mm)	Release Rate (m^3/s)	Unit Area Release Rate (L/s/ha)	Runoff Volume (m^3)	Runoff Coeff. (C)
Onsite Catchments						
1 in 100 Year 24-Hr	18.52	109.9	0.147	7.9	4,760	0.23
1 in 25 Year 24-Hr	18.52	88.2	0.073	3.9	2,400	0.15
1 in 5 Year 24-Hr	18.52	61.9	0.053	2.9	220	0.02
Offsite Catchment						
1 in 100 Year 24-Hr	1.24	109.9	0.063	50.8	520	0.38
1 in 25 Year 24-Hr	1.24	[redacted]	0.051	41.1	340	0.31
1 in 5 Year 24-Hr	1.24	61.9	0.037	29.8	150	0.21

For the post-development condition, the overall site was assumed to have a compacted gravel surface with approximately 19% imperviousness to account for impervious areas such as buildings and paved surfaces where infiltration losses will not occur. The simulated runoff volumes are presented in **Table 4**.

For stormwater management facility sizing, it is assumed discharges will not occur during a rainfall event. Following a rainfall event, the stormwater runoff water quality will be checked and if deemed clean, the SWMF will release the accumulated surface runoff water to the proposed drainage channel at the 5-year pre-development rate which is approximately 57.3 L/s based on the total service area of 19.76 ha. At this discharge rate, drawdown times for the proposed SWMF were computed and are presented in **Table 4** for the three return period rainfall events.

Table 4: Post-Development Flow Rates and Runoff Volumes

Rainfall Events	Area (ha)	Rainfall Depth (mm)	Controlled Release Rate (m^3/s)	Unit Area Release Rate (L/s/ha)	Required Storage Volume (m^3)	Runoff Coeff. (C)	SWMF Drawdown Time (hr)
Onsite (18.52 ha) and Offsite (1.24 ha) Catchment Areas							
1 in 100 Year 24-Hr	19.76	109.9	57.3	2.9	14,980	0.71	72.6
1 in 25 Year 24-Hr	19.76	88.2	57.3	2.9	11,200	0.66	54.3
1 in 5 Year 24-Hr	19.76	61.9	57.3	2.9	6,720	0.57	32.6
Offsite (1.24 ha) Catchment Area*							
1 in 100 Year 24-Hr	1.24	109.9	3.6	2.9	520	0.38	-
1 in 25 Year 24-Hr	1.24	88.2	3.6	2.9	340	0.31	-
1 in 5 Year 24-Hr	1.24	61.9	3.6	2.9	150	0.21	-

Note: Offsite catchment area is included in sizing of the proposed pond; however, during detailed design feasibility of flow diversion for the 1.24 ha offsite need to be investigated and removed is feasible.

4.3 SWMF DETAIL AND WATER QUALITY IMPROVEMENT

The proposed SWMF located in the northeast corner of the site will provide 14,980 m^3 of active storage during the 100-year 24-hour rainfall event. A pump station will be required to discharge the stored runoff to the north drainage channel. The pump discharge rate from the SWMF will be controlled to a pre-development flow rate for a 5-year 24-hour rainfall event or 57.3 L/s (2.9 L/s/ha). At this release rate, it will take 72.6 hours or 3 days to drawdown the SWMF after a 100 year 24-hour rainfall event. A freeboard of 0.5 m measured from the 100-year water level is recommended to provide additional storage for events exceeding the 1:100 year 24-hour design rainfall event. The SWMF should be emptied shortly after a rainfall event to minimize risk of flooding due to subsequent rainfall events.

Generally, for industrial sites with potential for contamination, regulatory approval requires testing for water quality and if deemed clean then it can be discharged to a natural drainage course. Also, to avoid potential contamination of groundwater, either a clay or synthetic liner will be required for the proposed SWMF. The liner design will need to consider the groundwater table to avoid liner floatation and depending on the site configuration (grading, SWMF and groundwater table), and potential risk of contamination, an underdrain system may need to be installed.

With a wet pond configuration, the proposed SWMF is expected to capture/settle the Total Suspended Solids (TSS) coarser than 75 microns requirement by the Province. For a wet pond, a minimum of 1.0 m of inactive/permanent storage is recommended to avoid re-suspension of settled particles during the drawdown operations.

The recommended design parameters for the proposed SWMF are as follows:

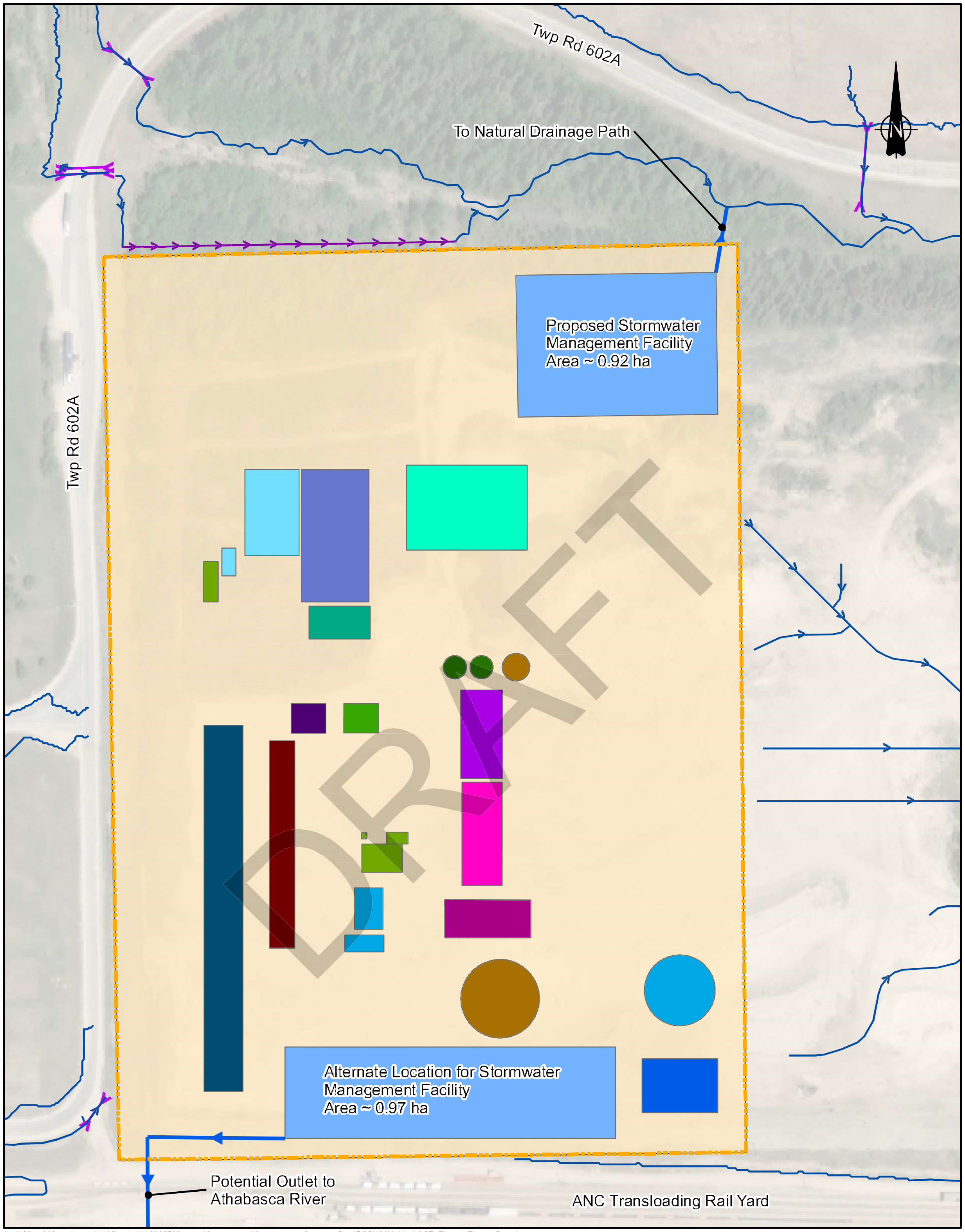
- Inactive Storage Depth = 1.0 m
- Active Storage Depth = 2.0 m
- Freeboard Depth = 0.5 m
- Pond Side Slope = 3H:1V (to be confirmed with geotechnical recommendation)
- Pond Area at Freeboard Level = 0.85 ha

The exact SWMF and outlet configuration will depend on the site grading plan. The onsite conveyance system ditches should be lined with vegetation or washed rock to control erosion and minimize transport of sediment to the SWMF. During the site visit, rill erosion was noticed on existing gravel pit walls. Therefore, establishing vegetation with hydroseeded topsoil may need to be installed to minimize erosion/sediments from steep graded slopes.

4.4 ALTERNATE OUTLET OPTIONS

For the proposed SWMP approval, advertising of the proposed SWMP is generally required under the *Water Act* by AEPA. In order to obtain this approval, AEPA requires agreement on the proposed SWMP from the downstream landowners. Although with the controlled release rate from the SWMF, the potential risk of flooding due to higher flow rates is mitigated, the higher runoff volume generated by new developments can result in a longer duration of wet conditions and greater risk of flooding in poorly drained area.

Considering this, an option for an alternate outlet route has been identified as shown on **Figure 5**. For this alternate outlet, the SWMF would discharge directly via a storm sewer to the Athabasca River. The outlet sewer would be installed within what appears to be the Township Road 602A road right-of-way. For this outlet option the proposed SWMF could be constructed along the southern boundary of the site. Depending on the site grading plan, it may be possible to construct a gravity or force main outlet up to the riverbank. Due to the steep bank, the outfall construction would require installation of a drop shaft (approximately 25 m deep) and possible hand tunneled pipe from the shaft to the outfall structure. The cost of such an outlet system is estimated to be approximately $3.5M million dollars.



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Revised: 2023-08-28 By: abnabi

August 2023
Project No.110220760

Stantec

300-10220 103 Avenue NW
Edmonton AB
www.stantec.com

Legend

- Project Site Boundary
- Diversion Ditch
- Existing Drainage Pattern
- Existing Culverts
- Outlet Option
- Stormwater Management Facility
- Graveled Area

Client/Project

Moraine Initiatives Limited

Moraine Power Generation Project

Stormwater Management Plan

Figure No.

5.0

Title

Proposed Stormwater Management Plan

5.0 CONCLUSIONS AND RECOMMENDATIONS

This report presents a SWMP for the proposed PGF development. Specific conclusions and recommendations are as follows:

- Approximately half of the proposed development site is to be located within a gravel pit area which is approximately 6 to 7 m lower than the surrounding unmined areas. A site grading plan has not been developed at this time; however, it will be critical for establishing the SWMP configuration during subsequent design stages.
- The gravel pit area drainage is self-contained with no major off-site area contributing flow. A diversion ditch is proposed along the north boundary of the site to re-route the intercepted runoff to the existing drainage channels located north of the site draining east. the existing low spot located near the west boundary of the site is assumed to be graded to drain into the proposed SWMF. For the purpose of this preliminary analysis, it is assumed the southwest offsite area (approximately 1.24 ha) will also drain into the proposed SWMF.
- Under the proposed development scenario, it was assumed that the PGF area will be surfaced with compacted gravel and only buildings and paved areas will result in impervious surfaces.
- A SWMF is proposed to be constructed in the northeast part of the site to collect runoff and then discharge to an existing drainage channel north of the site. The runoff water is assumed to require testing prior to discharging to the environment (i.e., requiring the SWMF to be sized to store all of the runoff volume). The flow from the SWMF will then be discharged at a controlled rate. Onsite drainage ditches and culverts will be required to convey the runoff to the SWMF.
- The proposed SWMF will require 14,980 m^3 of active storage volume for the 100-year 24-hour rainfall event. Depending on the site grading, a pumping system will likely be required to discharge the water from the SWMF to the north drainage channel. Pumping rate from the SWMF will be limited to a pre-development release rate from the 5-year 24-hour rainfall event which is 57.3 L/s (2.9 L/s/ha).
- Since the runoff from the proposed industrial development may be contaminated, the regulatory approval will likely require testing accumulated runoff in the SWMF prior to releasing to the environment. To avoid potential risk of contamination of groundwater, the proposed SWMF will need to be lined using either a synthetic or clay liner.
- Monitoring well data installed as part of the "Phase II Environmental Site Assessment" indicates the groundwater table is within 2 to 3.0 m of the existing gravel pit surfaces. Hence depending on the site grading and pond configuration, an underdrain system may be required to prevent synthetic liner floatation.

- The proposed SWMF is expected to capture 85% of particles coarser than 75 microns as per the Provincial water quality guideline requirement. A minimum 1.0 m deep permanent water depth is recommended to avoid re-suspension of settled particles during the drawdown operations.
- The SWMF is proposed to discharge at a controlled rate to the north drainage channel which conveys the runoff through other gravel pits south of the CN Rail line downstream of the 1,500 mm diameter culvert. Currently, a large area (approximately 500 ha at the 1,500 mm culvert) including a portion of Highway 43 also discharges through these gravel pits. Due to access limitations during the site visit it was not possible to verify if the runoff water accumulated in the gravel pit or drained without impacting the gravel pit area to the Athabasca River.
- An alternate outlet option has been identified to discharge directly to the Athabasca River along Township Road 602A at an approximate cost of $3.5M. This outlet option may need to be used if the approval of the proposed option is not feasible.

6.0 REFERENCES

AEP (1999), Stormwater Management Guidelines for the Province of Alberta. Edmonton, AB, Municipal Program Development Branch, Environmental Sciences Division, Environmental Service.

AEP (2013), Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems: Part 5 Stormwater Management Guidelines. Edmonton, AB.

NRCS (2004), National Engineering Handbook: Hydrologic Soil Cover Complexes, Washington, DC, Natural Resources Conservation Services, United States Department of Agriculture.

Appendix F List of Potential Chemicals

Dry Cooled Chemicals			
Chemical Name	**Power Island or Carbon Capture?**	**Order of Magnitude**	**What is the Chemical Used for?**
Aqueous Ammonia	Power Island	< 5 gal/hr	SCR, Condensate/Feedwater
Amine	Carbon Capture	Depends on Technology Provider	CO_2 Recovery
Caustic Soda	Carbon Capture	132 lb/day	CO_2 Recovery
Anti-Foam Agent	Carbon Capture	6.5 lb/day	CO_2 Recovery
Phosphate	Power Island	< 10 gal/hr	Fed to HRSG drums in an emergency (condenser tube leaks)
Nitrogen	Power Island	120 SCFM	HRSG Nitrogen Blanketing
Hydrogen	Power Island	90 SCFM	Generator Cooling
Glycol	Both	90,000 gallons/fill	CCW 60%/40% Water Mix
Corrosion Inhibitor	Both	< 1 gal/hr	CCW Shot Feeders
Carbon Dioxide	Power Island	120 SCFM	Startup Only
Scale Inhibitors	Power Island	< 1 gal/hr	Demin Water Treatment
Sodium Bisulfite	Power Island	< 1 gal/hr	Demin Water Treatment, WWT Reaction Tank(s), Ultrafiltration
Sodium Hypochlorite	Power Island	< 1 gal/hr	Ultrafiltration, Service Water Pump Recirc
Sulfuric Acid	Power Island	< 5 gal/hr	WWT Clarifier, WWT Reaction Tank(s)
Caustic	Power Island	< 5 gal/hr	Ultrafiltration, WWT Reaction Tank(s), Demin Water Treatment
Organosulfide	Power Island	< 1 gal/hr	WWT Reaction Tank(s)
Ferric Sulfate	Power Island	< 5 gal/hr	WWT Coagulant Tank(s), WWT Clarifier
Citric Acid	Power Island	< 1 gal/hr	Ultrafiltration
Polymer	Power Island	< 5 gal/hr	WWT Filter Press, WWT Clarifier

Wet Cooled Chemicals			
Chemical Name	**Power Island or Carbon Capture?**	**Order of Magnitude**	**Where is the Chemical Used?**
Aqueous Ammonia	Power Island	< 5 gal/hr	SCR, Condensate/Feedwater
Amine	Carbon Capture	Depends on Technology Provider	CO_2 Recovery
Caustic Soda	Carbon Capture	132 lb/day	CO_2 Recovery
Anti-Foam Agent	Carbon Capture	6.5 lb/day	CO_2 Recovery
Phosphate	Power Island	<10 gal/hr	Fed to HRSG drums in an emergency (condenser tube leaks)
Nitrogen	Power Island	120 SCFM	HRSG and Aux Boiler Nitrogen Blanketing
Hydrogen	Power Island	90 SCFM	Generator Cooling
Glycol	Power Island	10,000 gallons/fill	CCW 60%/40% Water Mix
Corrosion Inhibitor	Both	< 5 gal/hr	Cooling Tower Chemical Feed, CCW Shot Feeder
Carbon Dioxide	Power Island	120 SCFM	Startup Only
Scale Inhibitor	Both	< 1 gal/hr	Cooling Tower Chemical Feed, Demin Water Treatment
Sodium Bisulfite	Both	< 5 gal/hr	Cooling Tower Blowdown, WWT Reaction Tank(s), Ultrafiltration, Demin Water Treatment
Sodium Hypochlorite	Both	< 10 gal/hr	Cooling Tower Chemical Feed, Ultrafiltration, Service Water Pump Recirc
Sulfuric Acid	Both	< 40 gal/hr	Cooling Tower Chemical Feed, WWT Clarifier, WWT Reaction Tank(s)
Caustic	Power Island	< 10 gal/hr	Ultrafiltration, WWT Reaction Tank(s), Demin Water Treatment
Organosulfide	Power Island	< 5 gal/hr	WWT Reaction Tank(s)
Ferric Sulfate	Power Island	< 15 gal/hr	WWT Coagulant Tank(s), WWT Clarifier
Citric Acid	Power Island	< 1 gal/hr	Ultrafiltration
Dispersant	Both	< 5 gal/hr	Cooling Tower Chemical Feed
Polymer	Power Island	< 15 gal/hr	WWT Filter Press, WWT Clarifier

Chemical (SDS) Name	Common/Product Name	Manufacturer	Work Area	Max Qty	Units
Sika Plastocrete 250	Water Reducing Admixture	Sika	Concrete	2000	gal
SikaTard 440	Hydration Controlling Admixture	Sika	Concrete	1000	gal
Sika AEA-14	Air Entraining Admixture	Sika	Concrete	2000	gal
Sikament 475	Multi Range Water Reducing Admixture	Sika	Concrete	4000	gal
Upside Down Marking Paint - Safety Red (Subcontractor ILT)	Marking Paint	CRC	Civil	15	cans
Simple Green All Purpose Cleaner (Subcontractor ILT)	Simple Green	Sunshine Makers, Inc.	Civil	1	20oz bottle
Propane (Subcontractor ILT)	Propane	Airgas	Civil	14	bottles
Prediluted Engine Coolant/Antifreeze (Subcontractor ILT)	Coolant/Antifreeze	Prestone	Civil	2	gal
Brake Parts Cleaner (Subcontractor ILT)	Brake Parts Cleaner	O'Reilly Auto Parts	Civil	4	20oz cans
10W40 Motor Oil (Subcontractor ILT)	Motor Oil	Hess Corporation	Civil	2	qts
Gasoline (Subcontractor ILT)	Gasoline	Hess Corporation	Civil	30	gallons
Diesel Fuel (Subcontractor ILT)	Diesel Fuel	Hess Corporation	Civil	1100	gal
Ultragel II	Ultragel II	MagnaFlux	Quality	5	gallons
SKL-WP2 Aerosol	SKL-WP2 Aerosol	MagnaFlux	Quality	24	Cans
SKL-SP1 Aerosol	Red Penetrant	MagnaFlux	Quality	24	Cans
SKD-S2 Aerosol	SKD-S2 Aerosol	MagnaFlux	Quality	24	Cans
Mixture	SKC-S Aerosol	MagnaFlux	Quality	24	cans
7HF Aerosol	7HF Aerosol	MagnaFlux	Quality	12	Cans
WCP-2 Aerosol	WCP-2 Aerosol	MagnaFlux	Quality	12	Cans
Propylene Glycol	NO-TOX2	Tanner Systems, Inc.	Concrete	8	Gallons
Muriatic Acid	Muriatic Acid	KIK International LLC	Concrete	4	bottles
V-1 Non-Shrink Grout	Grout	Unisorb Installation Technologies	Mechanical	576	bags
Ethyl Alcohol, Glycerol	Splash RV & Marine Antifreeze -50 Deg F	FMP	Concrete	5	Drums
PRO LSPR 6PK MARK FLUORESCENT ORANGE	Upside down marking paint	Rust-Oleum	Civil	25	boxes
Multi-Purpose, Ammonium, Phosphate, Monoammonium Phosphate	Commercial ABC Dry Chemical. Fire Extinguisher	Kidde Residetial & Commercial	Maintenance	100	EA
VpCL-609/609 S Biodegradable Powders	Dissecant	Cortec Corporation	Mechanical	100	lbs
VPCL-337 / VPCL-337 Winterized	Dissecant	Crtec Corporation	Mechanical	100	lbs
Zinc Oxide	Oxide Inhibitor	Burndy	Electrical	1 Gallon	20
methacrylates, dibenzoyl peroxide, boric acid	HIT-HY 100, A&B	Hilti	Concrete	20	EA
Hydrogen Sulfide/Carbon Monoixide/Methane/Oxygen in Nitrogen	Calibration Gas	Intermountain Specialty Gases	Warehouse	5	Liters
WD-40®-SPECIALIST®-Fast-Drying-Contact-Cleaner_IL_EN_2.1_SDS	WD-40 CONTACT CLEANER	WD-40	Maintenance	6	CANS
3M GENERAL PURPOSE ADHESIVE CLEANER	3M GENERAL PURPOSE ADHESIVE CLEANER	3M	Maintenance	4	CANS
138APA-400	RED DIE DIESEL	SCHAEFFER MFG COMPANY	Maintenance	7000	GALLONS
KROIL PENETRANT - ORIGINAL (AEROSOL)	KROIL	KANO LABRATORIES LLC	Maintenance	20	CANS
GLASS CLEANER READY TO USE	GLASS CLEANER	SAFETY KLEEN	Maintenance	20	BOTTLES
MOBIL ANTIFREEZE EXTRA	ANTIFREEZ COOLANT	EXXON	Maintenance	75	GALLONS
B'LASTER PB PENETRATING LITHIUM GREASE	PB BLASTER	B'LASTER	Maintenance	20	CANS
MOBIL GREASE 28	GREASE	EXXON	Maintenance	50	TUBES
MOBIL ATF 220	ATF FLUID	EXXON	Maintenance	100	GALLONS
MOBIL HYDRAULIC 10W	10W HYDRAULIC OIL	EXXON	Maintenance	100	GALLONS
MOBILUBE HD PLUS 80W-90	GEAR OIL	EXXON	Maintenance	100	GALLONS
Mobil Geo 15W-40	15W-40 Oil	Exxon	Maintenance	100	Gallons
Windshield Wash	Windshield Washer Fluid	HOC Industries Inc.	Maintenance	30	Gallons
WD-40	WD-40 Multi Use Aerosol	WD-40 Company	Maintenance	30	Cans
Simple Green	Simple Green - All Purpose Cleaner	Sunshine Makers	Maintenance	20	Bottles
NAPA Diesel Exhaust Fluid	Def Blue	Napa Diesel Exhaust Fluid	Maintenance	400	Gallons
Safety Kleen Professional Brake Cleaner - <45% VOC - Bulk	Brake Cleaner	Safety-Kleen	Maintenance	20	Cans

Weld On #3	Weld On 727	A&C Plastics, INC	Electrical	100	Gallon
Mixture of Part A, Part B, Part C	Silka Armatec - 110 EpoCem	Sika Corporation	Concrete	1	Drum
Sodium Sillicate	LIQUI-HARD	W.R. MEADOWS, INC	Concrete	6	Drums
Mixture of Xylene, Ethylbenzene, Toluene	Swellstop Primer Adhesive	Sika Corporation	Concrete	1	Pail
Mixtures	Clear Resin Cure J11W	Dayton Superior	Concrete	4	Drums
Mixtures	Clean STrip J1A/Formoil	Dayton Superior	Concrete	2	Drums
Quikrete Cement Color (Liquid)	Quikrete Red Dye	The Quikrete Companies	Concrete	12	oz
Sika Post Fix Part B	Sika Post Fix Part B	Sika Corporation	Warehouse	350	oz
Sika Post Fix Part A	Sika Post Fix Part A	Sika Corporation	Warehouse	350	oz
Chain and Wire Rope Lubricant N0. 03050	Lubricant	CRC Industries, INC.	Maintenance	24	oz
PRO LSPR 6PK MARK FLUOR GREEN MARKING	Marking Paint/Aerosols	Rust-Oleum Corporation	Civil	48	oz