ENERGY Alberta

Peace River Nuclear Power Project

Initial Project Description

Report No. CA0038431-24003-R-Rev0

April 11, 2025

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ABBREVIATIONS AND UNITS OF MEASURE

Abbreviation	Definition
AAQG	Ambient Air Quality Guideline
AB	Alberta
ACSW	Arts Culture and Status of Women
AEPA	Alberta Environment and Protected Areas
BGS	Below Ground Surface
CANDU	Canadian Deuterium Uranium
CH_4	Methane
CN	Canadian National
CNSC	Canadian Nuclear Safety Commission
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COP	Conference Of Parties
COPC	Contaminants of Potential Concern
COSEWIC	Committee On the Status of Endangered Wildlife In Canada
CPZ	Contingency Planning Zone
CSA	Canadian Standards Association
DFO	Fisheries and Oceans Canada
DPZ	Detailed Planning Zone
EA	Environmental Assessment
EC6	Enhanced CANDU 6
ECCC	Environment and Climate Change Canada
EMS	Emergency Medical Services
EPZ	Emergency Planning Zone
GBA+	Gender-Based Analysis Plus
GDP	Gross Domestic Product
GHG	Greenhouse Gas
ha	Hectares
HADD	Harmful Alteration, Disruption, Or Destruction
HRA	Historical Resources Act
HRIA	Historic Resource Impact Assessment
HRO	Historical Resources Overview
HRV	Historic Resource Value
IAA	Impact Assessment Act
IAAC	Impact Assessment Agency of Canada
IAEA	International Atomic Energy Agency

Abbreviation	Definition
IK	Indigenous Knowledge
IPCC	Intergovernmental Panel on Climate Change
IPD	Initial Project Description
IPZ	Ingestion Planning Zone
IQR	Interquartile Range
IR	First Nation Reserve
IS	Impact Statement
km	Kilometre
km/h	Kilometre per Hour
km^2	squared kilometres
kPa	kilopascals
KWBZ	Key Wildlife and Biodiversity Zones
kWh	Kilowatt Hour
LTC	License to Construct
LTO	License to Operate
LGA	Local Geographic Area
LSA	Local Study Area
m	Metres
m^3	Cubic Metres
MBCA	Migratory Birds Convention Act
MD	Municipal District
mg/L	Milligrams per Litre
mg/m^3	Milligram per Cubic Metre
mg-N/L	Milligrams of Nitrogen per Litre
mm	Millimetres
m^3/s	Cubic Metres per Second
m/s	Metres per Second
Mw	Moment Magnitude
MWd/MgU	Megawatt-Day Per Metric Ton Uranium
MWe	Megawatts (electrical)
MWth	Megawatts (thermal)
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organization
NOx	Oxides of Nitrogen
NRCAN	Natural Resources Canada
OCAP®	Ownership, Control, Access, Possession

Abbreviation	Definition
PDP	Preliminary Decommissioning Plan
PGA	Peak Ground Acceleration
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter with a nominal diameter of 2.5 microns or less
PM_{10}	Particulate Matter with a nominal diameter of 10 microns or less
PNERP	Provincial Nuclear Emergency Response Plan (for Province of Ontario)
PRAMP	Peace River Area Monitoring Program
Qty	Quantity
RAP	Restricted Activity Period
RCMP	Royal Canadian Mounted Police
RSA	Regional Study Area
SACC	Strategic Assessment for Climate Change
SARA	Species At Risk Act
SCC	Species of Conservation Concern
SD	School District
SO_2	Sulphur Dioxide
SSC	Structure, System, and Component
SSSHA	Site-Specific Seismic Hazard Assessment
TLRU	Traditional Land and Resource Use
TSP	Total Suspended Particulates
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UTM	Universal Transverse Mercator
V_{S30}	Time-Averaged Shear-Wave Velocity across the upper 30 m below ground surface
°C	Degrees Celsius
%	Percent

1 INTRODUCTION

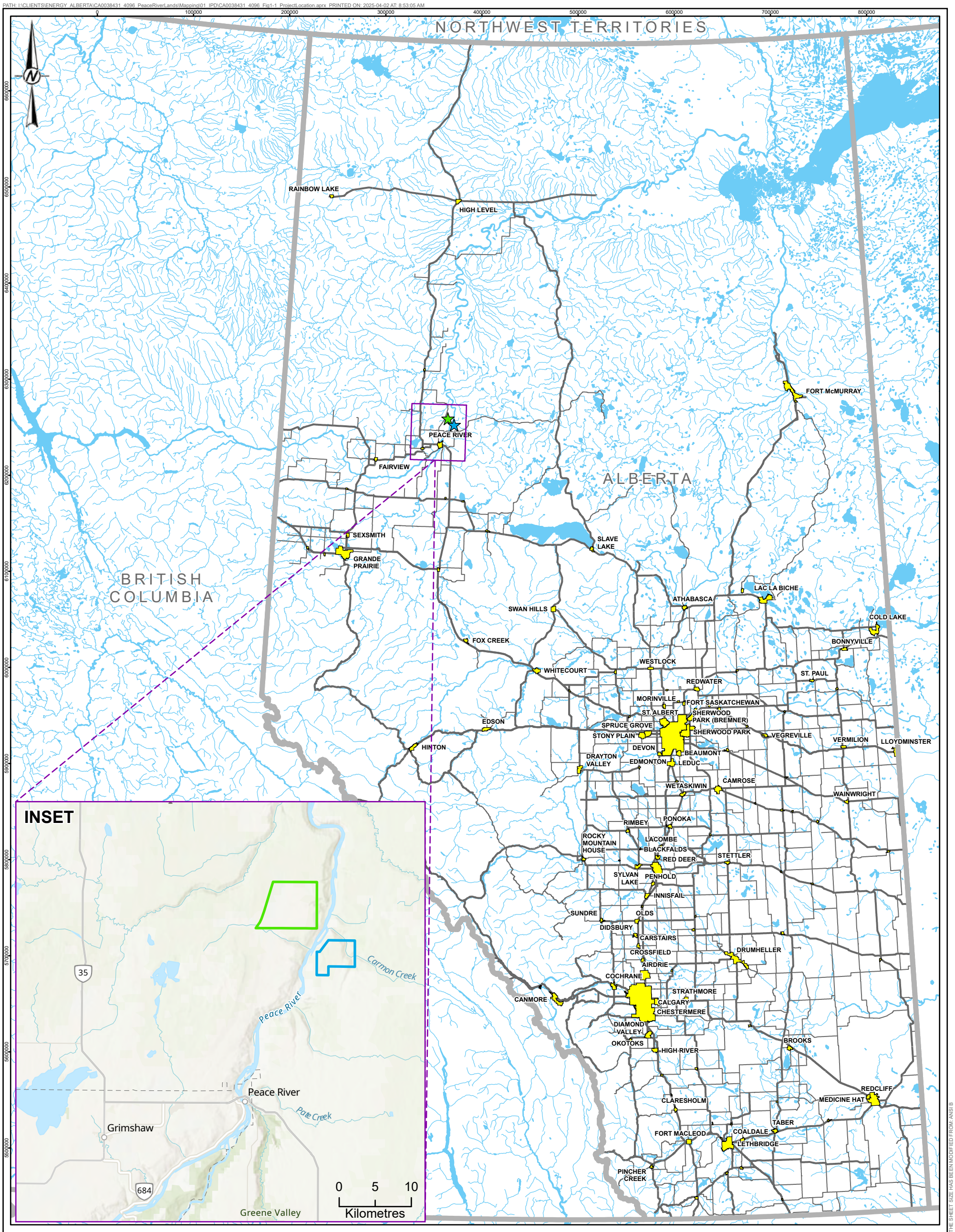
This document constitutes the Initial Project Description (IPD) for the Peace River Nuclear Power Project (the Project), a nuclear power generating facility proposed by EAC Capital Limited Partnership (trade name Energy Alberta) in the Peace River Region of Alberta (-1). This IPD has been prepared in accordance with the *Impact Assessment Act* (IAA), and contains all of the information prescribed in the following:

- Information and Management of Time Limits Regulations
- Guide to Preparing an IPD and a Detailed Project Description (GOC 2024a)
- Strategic Assessment of Climate Change (ECCC 2020a)

The Project is driven by and provides a solution to Alberta's need for non-emitting, reliable energy as part of the broader transition away from a fossil fuel-dominated energy mix. This Project would support Alberta's growing energy needs, while advancing federal and provincial carbon emissions goals.

Energy Alberta is a proud Alberta-based company that was founded in 2005 to bring nuclear power to western and northern Canada. As described below in more detail, this Project is important in furthering this vision.

The Project will build on the success of existing and long-standing Canadian nuclear power technology and existing research completed for the Project between 2005 and 2010. This Project will be an important component to diversify and strengthen electrical power grid in Alberta and to meet the climate change mitigation targets of the province and country.



LEGEND

- OPTION 1 PROJECT LOCATION
- OPTION 2 PROJECT LOCATION
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- POPULATED PLACE
- PROVINCIAL BOUNDARY
- WATERBODY

0 75 150

1:3,750,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 10TM AEP FOREST

REFERENCE(S)

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
PROJECT LOCATION

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MS
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO.	CONTROL	REV.	FIGURE
CA0038431.4096		0	1-1

2 PART A – GENERAL INFORMATION

2.1 Project Overview

Energy Alberta is proposing to develop a nuclear power generating facility in the Peace River region of Alberta and Energy Alberta is seeking to build and operate up to 4,800 megawatts of electricity (MWe) for the Alberta electrical grid. This Project involves the permitting, construction, operation, and eventual decommissioning of four (4) CANDU MONARK 1000MWe-class power reactors, arranged as a pair of twin-unit MONARK plants.

The facility will be seeking licensing to a maximum permitted envelope of 4,800MWe to account for the gross power production of each reactor, as well as potential for operational efficiencies to develop over time. Each reactor unit is expected to produce up to 1,100MWe gross output with a net of 1,000MWe sent to the electrical grid. This accounts for use of some power within the facility. With four CANDU MONARK reactors, the total gross capacity of the facility is expected to be within the 4,800MWe licence limit.

Licensing the total facility to 4,800MWe aligns with the licensed capacity of other nuclear power projects operating in Canada and therefore is expected to streamline aspects of the licensing process, while allowing for consideration of potential future efficiency improvements. This represents approximately 15 percent (%) of the province's current generation capacity, and 30% of future power needs. The generated energy will be sold through long-term contracts to Alberta consumers and industry.

The Project strives to drive economic growth, creating long-term, high-value jobs during both the construction and operational phases, while supporting local businesses and infrastructure development. The Project also encourages innovation and collaboration in advanced technologies, opening new avenues for skills development and research.

There are currently two locations under consideration for Project siting, as follows.

Option 1 (Figure2.1-1): The Project siting option is located east of Highway 743 and south of Township Road 864 in Alberta, within the County of Northern Lights, and on the west side of the Peace River, approximately 30 kilometres (km) north of the Town of Peace River. The Project location is within the Peace River region, part of the larger area of northern Alberta.

Option 2 (Figure2.1-2): The Project siting option is located north of Highway 986 and Township Road 854, and is directly adjacent to Range Road 203 in Alberta, the Northern Sunrise County, and on the east side of the Peace River, approximately 30 km north of the Town of Peace River. The Project location is within the Peace River region, part of the larger area of northern Alberta.

The final decision regarding the site location will be made after evaluating the technical and safety requirements, along with the key environmental, Indigenous and social criteria used to determine overall site suitability. This evaluation will build on similar assessments conducted in the region in 2008 and 2010. Energy Alberta plans to engage with Indigenous Nations and Communities, and local governments to gather input on the criteria for evaluating site suitability. A final decision on the site is expected to be made by late 2025.

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TWP 087 TWP 086 TWP 085

Twp.87 Rge.21 W5M
Twp.87 Rge.20 W5M
Twp.86 Rge.21 W5M
Twp.86 Rge.20 W5M
Twp.85 Rge.21 W5M
Twp.85 Rge.20 W5M

743

TOWNSHIP ROAD 864
TOWNSHIP ROAD 863
TOWNSHIP ROAD 862
TOWNSHIP ROAD 861
TOWNSHIP ROAD 860
TOWNSHIP ROAD 854
TOWNSHIP ROAD 852.5

RANGE ROAD 211
RANGE ROAD 215
RANGE ROAD 212
RANGE ROAD 213
RANGE ROAD 214
RANGE ROAD 220
RANGE ROAD 204
RANGE ROAD 203

Whitemud River
Peace River
Cannon Creek

RGE 22 W5M RGE 21 W5M RGE 20 W5M

LEGEND

- SECONDARY HIGHWAY
- LOCAL ROAD
- WATERCOURSE
- OPTION 1 SITING AREA OF INTEREST
- WATERBODY

0 1.5 3

1:65,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
PROJECT SITE CONTEXT - OPTION 1

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MS
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO.	CONTROL	REV.	FIGURE
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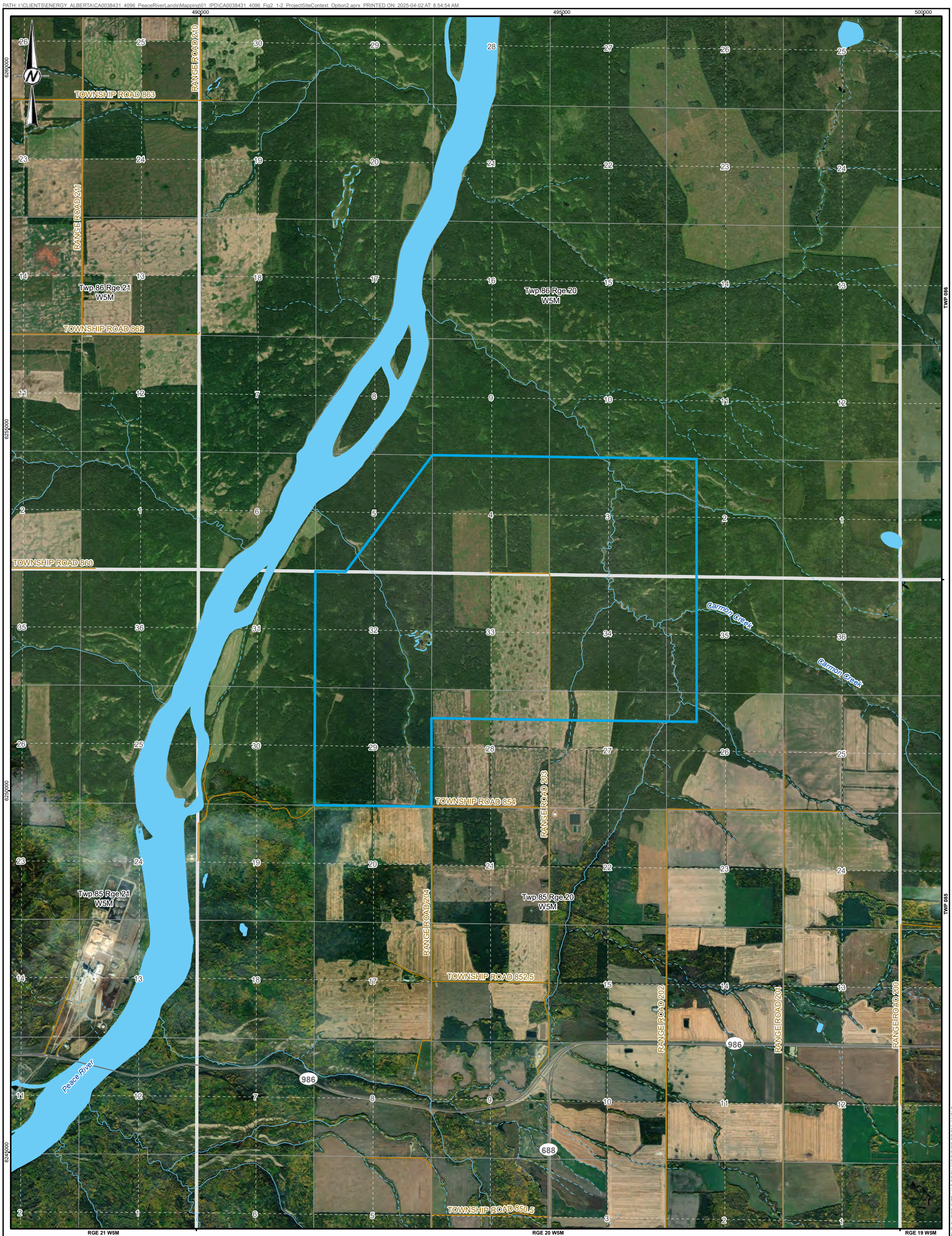

LEGEND

- SECONDARY HIGHWAY
- LOCAL ROAD
- WATERCOURSE
- OPTION 2 SITING AREA OF INTEREST
- WATERBODY

0 1 2

1:50,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
PROJECT SITE CONTEXT - OPTION 2

CONSULTANT

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2.2 Proponent Contact Information

Proponent: Energy Alberta

Energy Alberta Executive Contact (Primary Contact):
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Info@EnergyAlberta.com

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Amy Langhorne
Title: Project Director
Email: amy.langhorne@energyalberta.com
Info@EnergyAlberta.com

3 PART B - PLANNING PHASE RESULTS

3.1 Corporate Commitment to Engagement

Energy Alberta is committed to open, extensive and thorough engagement as a vital component to the success of the Project. We aim to build and sustain meaningful relationships based on mutual respect and trust with Indigenous Nations and Communities, non-Indigenous Stakeholders, local communities and other potentially affected parties. Energy Alberta recognizes the importance of engaging early and often to understand each group's unique interests. This is consistent with Energy Alberta's efforts to create a made-in-Alberta solution to inclusive long-term energy stability.

In alignment with its corporate, environmental, and social responsibilities, Energy Alberta is committed to undertaking engagement that will meet or exceed consultation and engagement requirements from federal and provincial agencies, and it will also draw upon current best practices for engagement in resource development.

Energy Alberta is currently in the Early Engagement stage of the Project. Ongoing dialogue and comprehensive engagement will continue throughout the Impact Assessment process and the lifecycle of the Project.

Energy Alberta will undertake a spectrum of engagement on the Project as depicted in .1-1 below, which is consistent with regulatory guidance (including the Impact Assessment Act, CNSC REGDOC1-1-1 and CNSC REGDOC-3-2-2) and best practices including International Association for Public Participation Canada's (IAP2) spectrum of engagement (IAP2 2024).

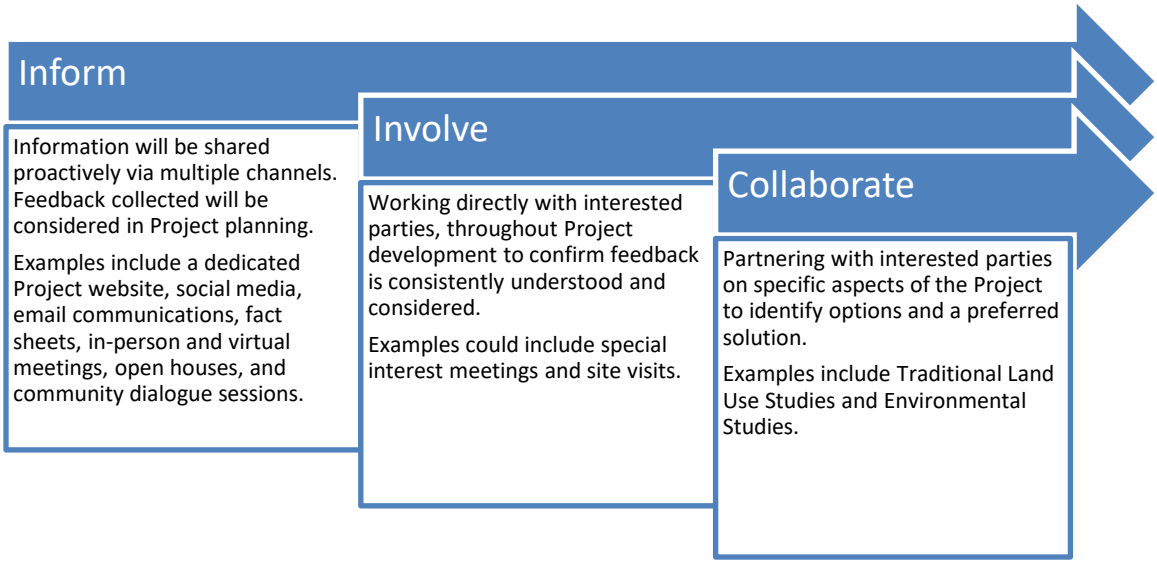


Figure 3.1-1: Spectrum of Engagement

3.2 Indigenous Engagement

Energy Alberta's engagement efforts are intended to be inclusive of Indigenous Nations, Bands, Communities, Métis Settlements and Groups potentially impacted by the Project. The term "Indigenous Nations and Communities" is used throughout Project documentation to represent this inclusion.

Engagement with Indigenous Nations and Communities is a corporate value of Energy Alberta, and a vital component of the Project process. Energy Alberta is committed to building meaningful, mutually-beneficial relationships with Indigenous Nations and Communities, guided by respect, integrity and a shared commitment to advancing reconciliation, and as outlined in its Indigenous Relations Policy and the principles below:

- **Respect for Indigenous Rights and Traditions:** Energy Alberta acknowledges the inherent and constitutionally protected rights of Indigenous Peoples and the significance of Indigenous Knowledge, values, and practices. Engagement will be conducted transparently, recognizing these rights as central to Energy Alberta's operations.
- **Commitment to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and Reconciliation:** Energy Alberta aligns its practices with the spirit and intent of UNDRIP and the principles of reconciliation, including addressing the Business and Reconciliation action of the Truth and Reconciliation Commission's Calls to Action.
- **Open, Respectful Communication:** Energy Alberta prioritizes open, respectful, and proactive communication with Indigenous Nations and Communities, ensuring their perspectives are considered in its decision-making processes. Energy Alberta is dedicated to ongoing dialogue and information sharing, with sensitivity to each community's unique values and cultural heritage.
- **Environmental Stewardship with Indigenous Knowledge:** Energy Alberta values Indigenous perspectives on environmental stewardship. Energy Alberta will actively integrate Indigenous Knowledge into its sustainability and environmental protection strategies, aiming to align its operations with Indigenous values of respecting the land and resources.
- **Equitable Economic Opportunities:** Energy Alberta is committed to creating economic opportunities for Indigenous Nations and Communities, including fair access to employment, training, and business partnerships. Energy Alberta seeks to support Indigenous economic growth by collaborating with Indigenous-owned businesses and investing in community-led initiatives.

Energy Alberta is also exploring the potential of economic participation of Indigenous Nations and Communities in the Project. In doing so, Energy Alberta aims to build meaningful partnerships so that Indigenous Nations and Communities are active participants in the economic benefits and environmental stewardship of the Project. Energy Alberta has drafted an initial Indigenous Engagement Plan (Appendix A). The plan is an evergreen document that will be implemented through-out the life cycle of the Project and will updated as appropriate and as engagement continues.

3.2.1 Indigenous Engagement Tools and Methods

Energy Alberta has identified a range of specific tools and methods to facilitate meaningful engagement with Indigenous Nations and Communities. These include:

- **Respect for Indigenous Decision-Making Processes:** Recognizing and respecting the governance structures and decision-making processes of Indigenous Nations and Communities.
- **Community-Led Engagement:** Seeking Indigenous Nations and Communities' input in determining the engagement process according to their cultural practices and priorities.
- **In-person Meetings and Workshops:** Prioritizing in-person engagement with Indigenous Nations and Communities through meetings, workshops, and site visits, where possible, to build trust and to foster collaboration.
- **Traditional Knowledge Integration:** Integration of Indigenous Knowledge into the assessment process in a respectful and valued manner.
- **Mediation and Conflict Resolution**: Implementing mechanisms for resolving disputes and addressing concerns that arise during the lifecycle of the Project.
- **Language and Cultural Sensitivity**: Translating communication materials (e.g., fact sheets) into applicable Indigenous languages, as requested. Conducting engagement activities that are culturally sensitive and appropriate.
- **Capacity Building and Support**: Providing resources, training, and financial support to Indigenous Nations and Communities to fully participate in the assessment process.
- **Written Submissions and Documentation:** Offering opportunities for Indigenous Nations and Communities to submit their views and concerns in writing, confirming their input is officially recorded.

An iterative and adaptive approach to engagement will respect each Indigenous Nation and Community's unique protocols and cultural practices. Feedback collected will be considered and integrated into ongoing Project planning.

3.2.2 Identification of Potentially Impacted Indigenous Nations and Communities

Energy Alberta sought guidance from the Government of Canada First Nation Profiles Interactive Map and the Alberta Aboriginal Consultation Office Electronic Disposition System Landscape Analysis Tool, to determine a preliminary list of Indigenous Nations and Communities that may be potentially impacted by, or have interest in, the Project. Additional mapping and information provided by Indigenous Nations and Communities during Energy Alberta's early engagement activities also informed the list.

Early engagement has been initiated and undertaken to varying degrees with the following Indigenous Nations and Communities (listed in alphabetical order):

- Athabasca Chipewyan First Nation
- Beaver First Nation
- Cadotte Lake Métis Nation
- Dene Tha' First Nation
- Driftpile Cree Nation
- Duncan's First Nation
- East Prairie Métis Settlement
- Fort Chipewyan Métis Nation
- Gift Lake Métis Settlement
- Horse Lake First Nation
- Kapawe'no First Nation
- Little Red River Cree Nation
- Loon River First Nation
- Lubicon Lake Band
- Mikisew Cree First Nation
- Otipemisiwak Métis Government
- Paddle Prairie Métis Settlement
- Peavine Métis Settlement
- Peerless Trout First Nation
- Sawridge First Nation
- Sturgeon Lake Cree Nation
- Sucker Creek First Nation
- Swan River First Nation
- Tallcree Tribal Government
- Treaty 8 Leadership
- Whitefish Lake First Nation
- Woodland Cree First Nation

As engagement progresses, the list of potentially affected Indigenous Nations and Communities may be updated, based on interest and feedback from Indigenous Nations and Communities, and additional planning and guidance from applicable regulators.

3.2.3 Summary of Indigenous Engagement Activities

Energy Alberta commenced its Indigenous engagement for the proposed Project, early in 2024. Since then, Energy Alberta has initiated contact with all the Indigenous Nations and Communities listed in Section 3.2.2 and has undertaken engagement to varying degrees based on the Nation or Community's interest and availability. The following provides summary of the early Indigenous engagement activities have been conducted to date.

- March 2024 through to January 2025 – Introductory emails containing the Project information package and mapping was sent to all Indigenous Nations and Communities.
- April 2024 through to March 2025 –Meetings with Indigenous Nations and Communities that indicated an interest in learning more about the Project and the potential for relationship agreements and/or investments in the Project and had capacity and availability to meet.

- November 2024 through to March 2025 - Introductory meetings with Indigenous Nations and Communities, as they were available, to outline the Project scope, key objectives, deliverables, timelines, and roles and responsibilities of team members. This was also an opportunity to discuss expectations, identify potential challenges, and establish communication protocols to facilitate collaboration throughout the Project.
- January 2025 through to March 2025 – Discussions with Indigenous Nations and Communities that had already engaged more extensively with Energy Alberta, regarding the draft IPD to gather their initial feedback on the draft. Of note, all Indigenous Nations and Communities will have an opportunity to provide feedback on the IPD through the Planning Phase of the Impact Assessment process.
- February 2025 - A Project update email was sent to Indigenous Nations and Communities that contained information on how to stay connected, the results of Energy Alberta's preliminary land investigations, an indication that the Impact Assessment Agency of Canada (IAAC) would be reaching out to facilitate its own consultation process, and a request from Energy Alberta to meet.
- March 2025 – In-person dialogues with Indigenous Nation and Community members in attendance at the Public Open House.

Based on interest and availability, to date Energy Alberta has had the opportunity to meet face to face with the following Indigenous Nations and Communities:

- Beaver First Nation
- Cadotte Lake Métis Nation
- Duncan's First Nation
- Lubicon Lake Band
- Otipemisiwak Métis Government
- Peavine Métis Settlement
- Sawridge First Nation
- Woodland Cree First Nation

Detailed records of engagement including topics of interest are being maintained and will be provided according to regulatory requirements and applicable stages of the Project. Records of engagement will be provided to Indigenous Nations and Communities for review and validation prior to submission to regulatory agencies.

3.2.4 Preliminary Topics of Interest

Engagement with Indigenous Nations and Communities is ongoing. As such, some but not all potentially impacted Indigenous Nations and Communities have identified topics of interest related to the Project. Feedback has been received through introductory meetings and correspondence. To date, Energy Alberta has compiled a list of preliminary topics of interest to Indigenous Nations and Communities including, but not limited to, those listed in Table 3.2-1.

Table 3.2-1: Topics of Interest

■ Accidents and Malfunctions	■ Cumulative Impacts	■ Capacity Funding
■ Community Benefits and Investments	■ Community Services impacts	■ Cultural Preservation
■ Broad Economic Benefits	■ Employment and Training opportunities	■ Environmental Impacts and Mitigations
■ General Consultation and Engagement plans	■ Human Health Risks	■ Indigenous & Treaty Rights impacts
■ Indigenous Economic Inclusion and Equity Partnership	■ Indigenous Project Participation and Involvement	■ Nuclear science education
■ Options Analysis (including comparison to Solar and Wind)	■ Post-Closure Monitoring	■ Power generation (proportion of increased power demand will be provided by the Project)
■ Project Scope, specifically baseline studies	■ Proponent participation in community and on the land	■ Recreation impacts
■ Regulatory Process	■ Relationship to Site C Dam	■ Safety of facility and community
■ Sedimentation in the Peace River	■ Seismic activity including fracking and earthquakes	■ Socio-Economic Impacts
■ Traditionally important species such as Bear, Elk, Fish, Moose, Caribou, Squirrel	■ Traditional Land Use, archaeology and culturally sensitive sites	■ Understandable materials (e.g., Plain Language, translation to Indigenous languages, visual representations)
■ UNDRIP – free, prior and informed consent	■ Waste Management	■ Water including: water use, water volume, impacts to water quality and temperature

Duncan's First Nation, Lubicon Lake Band, and Woodland Cree First Nation so far have provided the most feedback received in relation to the Project. They have also each had an opportunity to review a draft of this IPD. Of note, all Indigenous Nations and Communities will have an opportunity to provide feedback on the IPD through the Planning Phase of the Impact Assessment process.

Duncan's First Nation submitted to Energy Alberta, a formal initial memorandum with preliminary feedback on the Project and requested a copy of their memorandum be attached to the IPD (Appendix B).

Continued engagement will help to inform the Topics of Interest list which will be considered in ongoing Project design and through the IA.

3.2.5 Future Indigenous Engagement Activities

Ongoing and comprehensive engagement will continue through the Impact Assessment and lifecycle of the Project. Engagement activities will be based on each Indigenous Nation or Community's interest and degree of potential impact. Energy Alberta has identified the following activities for this next phase of Indigenous engagement.

- **Circulate notification packages -** In alignment with the IAAC, Energy Alberta will send notification packages to potentially impacted Indigenous Nations and Communities, as identified in Section 3.2.2.
- **Introductory meetings -** Energy Alberta will continue to seek introductory meetings with potentially impacted Indigenous Nations and Communities that have not yet met with Energy Alberta. This will be an opportunity to outline the Project, key objectives, deliverables, timelines, and roles and responsibilities of team members, as well as an opportunity to discuss expectations, identify potential challenges, establish communication protocols and answer questions.
- **Confirm engagement preferences and protocols –** Identify preferred methods for ongoing engagement with each Indigenous Nation or Community. These could include, but are not limited to:
  - in-community meetings;
  - visiting Project sites or important community locations;
  - participation in field work and studies;
  - topic-specific technical workshops;
  - plan and undertake appropriate studies (e.g. traditional land use, Indigenous knowledge, cultural heritage, etc.)
  - community dialogue sessions; and
  - sponsorship and/or attendance at Indigenous events.
- **Circulate notifications of regulatory filings and progress through the regulatory process -** Energy Alberta will provide Indigenous Nations and Communities with notification in advance of regulatory filings and to provide updates as the Project progresses through the regulatory processes.

3.3 Public Engagement

Energy Alberta seeks to identify opportunities for collaboration and build long-term relationships that provide value to the Peace River Region. Public engagement activities are intended to maximize information available to the public, increase the public understanding of the Project, and

gathering input from the public to be incorporated into Project plans, where practicable. Public engagement will continue throughout the lifecycle of the Project.

Public engagement planning and execution will continue throughout the lifecycle of the Project with public input helping shape the development of the Project. Feedback loops will be created to maximize two-way dialogue between the public and Energy Alberta. Feedback collected through Public engagement activities will be integrated into Project planning.

3.3.1 Public Engagement Tools and Methods

Energy Alberta has identified a range of specific tools and methods to facilitate public engagement with a variety of audiences with varying interests in the Project. These include, but are not limited to:

- **Presentations and Meetings:** Offering direct discussions with small to medium sized groups to share Project information, to address questions, and to advance overall understanding of the Project and the area.
- **Correspondence and phone calls:** Allowing for focused two-way communication that enables capture of engagement views and Project interests.
- **Illustrations, diagrams, infographics, models and charts:** Bringing variety to the ways in which Energy Alberta communicates Project details so that stakeholders may see the Project from different perspectives, including more tactile methods.
- **Project Descriptions, Newsletters, Brochures, fact sheets, informational post cards:** Targeted, topical communication materials that empower stakeholders to obtain specific Project information that is of interest to them.
- **Advertisements (written and radio) and other media coverage, Podcast talks, speaking engagements, panel discussions, interviews:** Conducting engagement communications to broader audiences to increase awareness and interest.
- **Workshops, Open Houses (in person and virtual), Community Dialogue Sessions, Conferences, Focus Groups, Working Groups, Site Visits, Tours:** Facilitating a variety of in-person events and means of collaborate, to foster input and generate greater understanding of the Project directly with Energy Alberta experts.
- **Participation and/or sponsorship of community events:** Demonstrating good corporate citizenship and the support of local community organizations to build trust and foster a positive reputation.
- **Online Content:** A dedicated Project website, social media, surveys, feedback forms, questionnaires, videos, online information library and other online resources that provide easy access to information and tools to provide input and feedback.
- **Mediation and Conflict Resolution:** Implementing mechanisms for resolving disputes and addressing concerns that arise during the lifecycle of the Project.

3.3.2 Identification of Public Stakeholders

3.3.2.1 Local Governments

Engaging with local governments is essential for Energy Alberta to understand community considerations and concerns, including the capacity of local infrastructure and services to support the construction and operation of the Project. Energy Alberta also engages with local governments to build a positive long-term partnership in the community in which we plan to operate.

Energy Alberta has identified the following municipal and regional villages, towns, counties and municipal districts in relation to the Project:

- Birch Hills County
- Clear Hills County
- County of Northern Lights
- Municipal District of Fairview No. 136
- Municipal District of Peace No. 135
- Municipal District of Smoky River No. 130
- Northern Sunrise County
- Town of Fairview
- Town of Falher
- Town of Grimshaw
- Town of Manning
- Town of McLennan
- Town of Peace River
- Village of Berwyn
- Village of Donnelly
- Village of Hines Creek
- Village of Nampa
- Peace Regional Energy Committee

3.3.2.2 Chambers of Commerce

Energy Alberta is committed to providing economic benefits to the local community and area residents. Engaging with local Chambers of Commerce will help to identify the opportunities and challenges to realizing these economic benefits.

Energy Alberta has identified, and will engage with, the following local Chambers of Commerce in relation to the proposed Project:

- Peace River & District Chamber of Commerce
- Manning & District Chamber of Commerce
- Fairview & District Chamber of Commerce
- Grimshaw & District Chamber of Commerce

3.3.2.3 General Public, Residents and Landowners

Providing opportunities for education, enhancing general understanding about the Project and the associated potential impacts and benefits, is a key objective of engagement with neighbouring residents, landowners and members of the public. For the general public, residents and landowners who may prefer to not engage in person, or in direct, verbal dialogue, Energy Alberta will provide online engagement tools. Additionally, Energy Alberta will have a local presence in Peace River by way of an office that is staffed by Project representatives.

3.3.2.4 Business Associations

Energy Alberta engages with industry and business associations to share and hear about emerging best practices, through attendance and participation at events such as the Small Modular Reactor Canada Summit, the Independent Power Producer Society of Alberta Conference, the Canadian Nuclear Association Conference, the Peace Region Energy Show and various tradeshows, such as the County of Northern Lights Regional Tradeshow.

In addition, Energy Alberta has engaged with the Peace Regional Energy Committee, given its purpose to look at opportunities to bring all forms of power generation to the Peace Region. Energy Alberta also collaborated with the Peace Regional Energy Committee on a panel discussion at the Small Modular Reactor Canada Summit, March 2025.

3.3.2.5 Non-Governmental Organizations (NGOs) and Environmental Groups

It is important to Energy Alberta that NGO's and Environmental Groups participate in the Impact Assessment process, as their perspectives will help inform Energy Alberta's development decisions. Identification of NGO's and Environmental Groups has been initiated and formal introductions and engagement activities are planned for Q2 2025 and beyond.

3.3.3 Summary of Public Engagement Activities

Energy Alberta commenced its most recent engagement with the public and other interested parties early in 2024. This was an opportunity to introduce Energy Alberta and its proposed Project publicly.

To date, Energy Alberta has completed a number of early public engagement activities for the Project, including:

- April 2024 - Meeting with Municipal Councillors and the Chamber of Commerce to introduce Energy Alberta's proposed Project, discuss Project technical details, and understand community interests and questions.
- July 2024 – Meeting with Peace Regional Energy Committee to provide a Project update including overview of site selection, engagement efforts to date, upcoming engagement, and contracting.

- August 2024 - Meeting with Peace Regional Energy Committee to provide a Project update including communications plan, anticipated location, and engagement.
- September 2024 – Meeting with Reeve, County of Northern Lights and MLA, Peace River to provide a Project overview including information regarding rationale, initial development location, partnerships, engagement, and economic impacts.
- September 2024 – Meeting with Peace Regional Energy Committee and Lac Cardinal Regional Economic Development Board to discuss updates to financing and community support strategies/grants.
- October 2024 - Meeting with Peace Regional Energy Committee to discuss the regulatory process and next steps, including the IPD timeline.
- November 2024 – Meeting with Peace Regional Energy Committee to discuss details on nuclear waste management, including government mandates.
- December 2024 –draft IPD was sent to Peace Regional Energy Committee for review and feedback.
- January 2025 – Meeting with Peace Regional Energy Committee to discuss Alberta Nuclear Reactor Licence and engagement plans, including initial engagement sessions and public open houses. Additional meeting to discuss CANDU MONARK reactors, regulatory status, nuclear safety precautions, nuclear power generation, and plans for a technical session, a March 2025 open house and a upcoming conference panel.
- January 2025 – Meeting with Grimshaw and District Chamber of Commerce, Peace River and District Chamber of Commerce, Lac Cardinal Regional Economic Development Board, Northern Sunrise Economic Committee, Peace Region Economic Development Alliance, Town of Peace River Economic Development Committee, and Town of Peace River Legislative Services to discuss technology, workforce expectations, anticipated facility footprint, regulatory process, and upcoming studies.
- February 2025 – Meeting with Peace Regional Energy Committee to provide Project updates and a technical workshop to discuss Nuclear Power Fundamentals.
- February 2025 – Meeting with Northern Sunrise County to provide Project updates.
- March 2025 – Meeting with Peace River and District Chamber of Commerce to provide Project updates.
- March 2025 - General Public Open House. Details are captured in Section 3.2.4.
- March 2025 – Meeting with Peace Regional Energy Committee to provide and overview of open house feedback and next steps for the Project.

Early engagement efforts with the landowners and area residents has been ongoing since the spring of 2024 and Energy Alberta has secured the necessary parcels of land to explore the feasibility of the two possible locations. These discussions were conducted directly between Energy Alberta and landowners.

During the first week of March of 2025 Energy Alberta contacted approximately 46 adjacent landowners/residents. An Energy Alberta representative met in-person with adjacent landowners/residents and provided a Project Letter and a personal invitation to the upcoming open house. As Project planning continues and when a final site is selected, a list will be provided along with an illustration of these area residents in relation to the Project site.

3.3.4 Public Open House - March 11, 2025

Energy Alberta conducted a public open house on March 11, 2025 at the Weberville Community Hall, which is situated between one of the proposed Project sites and the Town of Peace River. The Open House was advertised on two local radio stations, River Country and KIX FM, as well as through digital advertisements in the Peace River Record Gazette

Approximately 350 individuals attended the Open House, including Indigenous Peoples, community members and government officials.

At the Open House, Energy Alberta provided approximately 200 copies of eight factsheets (see Appendix C) for attendees as take aways to learn more about the following topics:

- Project Overview
- Nuclear Energy
- Safety
- Waste Management
- Water Use
- Land Use/Siting
- Lifecycle of Uranium
- Radiation Safety

Poster boards (see Appendix D) were displayed around the room, detailing the following information:

- About Energy Alberta
- Project Overview (including a Project area map)
- Site Evaluation Process
- CANDU Technology boards (3)
- Water Use (including visuals representations for cooling water infrastructure and how the cooling system works for power production)
- Energy Alberta's Commitment to Water Management
- Nuclear Waste Management
- Radiation Safety (including examples of dosage exposure)
- Used Nuclear Fuel
- Proposed Regulatory Timeline

- Benefits of Nuclear Energy in Canada
- Connect with Us (including QR codes to the procurement and jobs registry on EnergyAlberta.com)
- Interactive feedback boards (2) with prompt questions for public input

Energy Alberta subject matter experts were located around the poster boards and engaged with Open House attendees regarding the content of the boards, to introduce the Project, to educate and learn from participants. In addition, representatives from the Canadian Nuclear Association, the CNSC and the IAAC were available to share more information with attendees, independent from the Energy Alberta Project-specific information.

3.3.4.1 Open House Feedback

Energy Alberta provided a feedback form, both hard copy and virtual, for open house attendees to provide comments and feedback regarding the proposed Project. The feedback forms included eight questions including an indication of attendee satisfaction with the information provided and questions being answered at the Open House, and an opportunity for attendees to indicate their interests and/or concerns associated with the Project. The feedback forms also allowed participants to opt in to receive a follow-up from the Project and to sign up to receive Energy Alberta's newsletter. A total of 34 feedback forms were received - 32 of those were hard copies and two were submitted virtually. As indicated on the forms received, 18 email addresses were provided as an indication of their interest in either receiving a follow-up on their outstanding questions and/or to be added to Energy Alberta's newsletter distribution list. Energy Alberta subject matter experts completed Record of Contact forms that captured their conversations with attendees.

Two interactive poster boards posed questions for attendees at the Open House which enabled attendees to provide comments/feedback to Energy Alberta via post-it notes. One board encouraged attendees to write their sentiment(s) regarding 'How would you like to be engaged about this Project?' and 24 post-it notes were captured on this board. The second board asked, 'What's important to you and you community?' and 25 post-it notes were captured on this board.

The input and feedback gathered at the Open House be reviewed by Energy Alberta and used to inform future Project development and engagement activities. A summary of Open House and the input and feedback gathered will be included in Energy Alberta's inaugural newsletter in Q2 2025.

3.4 Future Public Engagement Activities

For 2025 and beyond, Energy Alberta plans to continue ongoing public engagement, as well as improving Project updates and building relationships. Energy Alberta is assessing the early engagement input to date to inform updates to its engagement plans. Examples of future engagement activities could include, but are not limited to:

- **Notification Packages:** Prepare and distribute updated notification packages to inform members of the public about the Project scope, timelines, and engagement processes;
- **Ongoing Introductory Meetings:** Schedule introductory meetings with relevant stakeholder groups to present Project information and address any questions or concerns;
- **Public Open Houses (in-person and virtual):** Host public open houses in local communities to provide Project details and gather ongoing feedback from attendees;
- **Workshops:** Conduct topic-specific technical workshops that allow attendees to discuss the potential Project impacts, share their perspectives, and contribute to the planning process;
- **Response to Inquiries:** Prompt response to the Project dedicated toll-free and Info@ email system available for public inquiries;
- **Newsletters and Updates:** Create and distribute newsletters or Project updates to keep the public and other interested parties informed about milestones, changes, and upcoming events.

Stakeholder engagement activities will continue to adapt as additional input from the public and other interested parties is received on how they would prefer to be engaged (e.g., feedback from the March Open House).

3.5 Assessments Relevant to the Project

There are no regional assessments as defined in Sections 92 and 93 of the IAA in the region near the Project.

The Strategic Assessment of Climate Change (SACC; ECCC 2020a) is a strategic assessment under Section 95 of the IAA and is relevant to the Project. This relates to the extent to which the Project hinders or contributes to the Government of Canada's (GOC) ability to meet its commitments in respect of climate change, such as the Paris Agreement, Canada's 2030 target, and the goal of Canada achieving net-zero emissions by 2050. The quantification of greenhouse gas (GHG) emissions per the SACC and its supporting guidance documents are presented in Section 7.8. In particular, descriptions will be provided on how the Project will help Canada achieve the 2050 net-zero carbon emissions target by contributing to decarbonization pathways.

There are no other strategic assessments as defined in Section 95 of the IAA that are relevant to the Project.

Indigenous Knowledge studies will be conducted as the Project progresses starting from the early stages throughout the Impact Assessment. These studies are essential so that the concerns and perspectives of Indigenous Nations and Communities are appropriately understood and addressed. Incorporating Indigenous perspectives can provide valuable insights into the local environment, climate resilience, and sustainable development practices that align with the values of Indigenous Peoples. The use of Indigenous Knowledge will be integrated into environmental monitoring, impact assessment, and the design of mitigation strategies, so that the Project supports the interests of the Indigenous Nations and Communities in the region.

3.6 Other Relevant Studies

The following studies or plans may be relevant to the development of the Project:

- County of Northern Lights Municipal Development Plan Bylaw #10-61-270: This plan outlines the development guidelines and regulations for the County of Northern Lights, which includes one of the potential sites for the Project.
- Integrated Watershed Management Plan of the Peace and Slave Watersheds: This plan focuses on managing water resources in the Peace and Slave watersheds, ensuring sustainable use and protection of water quality.
- Peace River Water Use Planning: This plan addresses the use and management of water resources in the Peace River, which is crucial for the Project's water needs.
- Wood Buffalo National Park World Heritage Site Action Plan: This plan aims to protect and manage the natural and cultural heritage of Wood Buffalo National Park, which is located near the Project area.

These studies and plans help the Project development align with local development guidelines, sustainable water management practices, and environmental protection efforts.

4 PART C – PROJECT INFORMATION

4.1 Purpose of and Need for the Project

4.1.1 Purpose of the Project

The purpose of the Project is to provide the province of Alberta an additional electrical supply that will support Alberta's growing energy needs and contribute to the provincial economic growth, while supporting federal and provincial governments in meeting their GHG reduction goals. According to the Canada Electricity Advisory Council, electricity is poised to play a sizable role in the Canadian economy over the coming decades, driven by a demand for dependable and non-emitting energy sources, including nuclear power (GOC 2024c).

The Project plans to deploy four (4) 1,000MWe class CANDU MONARK power reactors, configured as a pair of twin units. Each reactor unit is expected to produce up to 1,100MWe gross output, with a net of 1,000MWe sent to the electrical grid. This accounts for use of some power within the reactor facility. With four CANDU MONARK reactors on the site, the total gross capacity of is expected to be approximately 4,400MWe. However, licensing the total facility to 4,800MWe aligns with the licensed capacity of other nuclear power projects operating in Canada and allows for consideration of potential future efficiency improvements and additional contingencies.

This Canadian technology expands existing oil sands and energy services capability to build a new Alberta-based supply chain and grow an extensive number of other specialized highly skilled workers within the province. It further provides energy supply security as it uses natural uranium, with no requirement for enrichment and with 100% domestic fuel manufacturing.

4.1.2 Need for Electricity

Canada and Alberta have committed to a net-zero power grid by 2050. At the same time, electricity demand growth expectations are increasing dramatically. The Alberta Electric System Operator's (AESO's) most recent Long-Term Outlook (https://www.aeso.ca/grid/grid-planning/forecasting/2024-long-term-outlook) is forecasting an approximately 50% average load growth and as much as 100% peak load growth under its high electrification scenario by 2050.

The AESO has also identified the need for dispatchable resources, especially non-emitting resources, in several recent publications. The 2023 Reliability Requirements Roadmap (https://www.aesoengage.aeso.ca/reliability-requirements-roadmap) identified the challenges that the grid was facing with the additions of variable, invertor-based resources such as wind and solar and the concurrent loss of large synchronous generation types through the coal phase-out and retirement of the larger inefficient coal to gas conversion units. The AESO's earlier Net-Zero Pathways Report (https://www.aeso.ca/assets/Uploads/net-zero/AESO-Net-Zero-Emissions-Pathways-Report.pdf) highlighted the capital investment required to meet the decarbonization objective and the critical role that dispatchable technologies play in a long-term fully decarbonized grid.

The advancement of the Project would advance the ability of Alberta to meet its decarbonization objectives while maintaining a safe, reliable baseload power and allowing room for renewables to operate in response to changing demand for electricity.

4.1.3 Need for Nuclear to Reach Net-Zero Emissions

With the adoption of the Paris Agreement (UNFCCC 2016) in December 2015, almost all Parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed to prepare Nationally Determined Contributions (NDCs) to reach net-zero by 2050 (ECCC 2020b). The NDCs are specific climate action plans and commitments that individual countries make to reduce GHG emissions and address climate change, depending on its unique circumstances and capabilities (UNFCCC 2016). These commitments were further enhanced during the 2021 United Nations Climate Change Conference (Conference of Parties [COP] 26). To reach this goal, GHG emissions from electricity generation must fall to nearly zero by the middle of this century, even as electricity needs worldwide continue to grow and expand in end-uses, such as transportation, heating and industrial energy use (ECCC 2020b).

Nuclear energy, with around 413 gigawatts of capacity operating in 32 countries, contributes to reducing GHG emissions and address climate change by avoiding 1.5 gigatonnes of global emissions and 180 billion cubic metres (billion m^3) of global gas demand a year (IEA 2024). While wind and solar photovoltaics are expected to lead the push to replace fossil fuels, they need to be complemented by dispatchable resources, such as nuclear power. Indeed, the potential for nuclear power to accelerate the transition to net-zero and improve global energy security was endorsed by all G7 leaders in 2024 (GOC 2024d). As today's second largest source of low emissions power after hydropower, and with its dispatchability and growth potential, nuclear can help ensure secure, diverse low emissions electricity systems (IEA 2024).

Nuclear power provides about 10% of global electricity supply (IEA 2019); however, much more nuclear power is required to achieve the Net-Zero Emissions by 2050, based on the "Net-Zero Emissions Scenario". To get on track with the Net-Zero Emissions Scenario and to meet global electricity demands (which are expected to double over the next three decades [IAEA 2021]), global nuclear capacity needs to expand by about 15 gigawatts per year on average (just over 3% annual growth) to 2030, helping to maintain nuclear power's share of electricity generation at around 10% (IEA 2024). According to the International Atomic Energy Agency's (IAEA) projection, nuclear energy could contribute about 12% of global electricity by 2050 (IAEA 2021).

The Government of Canada is committed to achieving net-zero emissions by 2050. The *Canadian Net-Zero Emissions Accountability Act*, which became law in June 2021, enshrines in legislation Canada's commitment to achieve net-zero emissions by 2050. At the COP26, Canada further committed to a target of reducing emissions by 45% by 2030, and to achieving a net-zero emissions electricity sector by 2035 (GOC 2021b). These commitments are reiterated along with actions to

achieve them in the Government of Canada's 2030 Emissions Reduction Plan (ECCC 2022) addressing economy-wide GHG reductions, in Powering Canada forward (NRCan 2023) addressing electricity sector decarbonization efforts, and in recent federal budgets highlighting clean energy investments. In each of these critical government documents, the importance of expanding nuclear power as a source of non-emitting electricity is highlighted.

Alberta is uniquely placed to take advantage of this developing sector due to its strong history of energy investment and high rates of public support for nuclear technology. According to research commissioned by the Canadian Nuclear Association, Alberta, Ontario and Saskatchewan stand out for notably positive views about nuclear power (CNA 2023). The Emissions Reduction and Energy Development Plan is Alberta's approach to enhance their position as a global leader in emissions reductions, clean technology and innovation, and sustainable resource development. Alberta's plan includes an aspiration to achieve a carbon neutral economy by 2050, and achieve 30% renewable energy by 2030, which includes the use of nuclear power (GOA 2024a).

4.1.4 Value Added and Economic Growth

As with nuclear power generally, the economic benefits of the Project will span across Canada. For instance, the growth of nuclear power in Canada represents an opportunity to continue growing Canada's nuclear industry and supply chain by creating and sustaining highly skilled jobs. Studies indicate that nuclear power plants create some of the largest economic benefits compared to other electric generating technologies due to their size and the number of workers needed to operate the plants (Nuclear Energy Institute 2012). Based on modelling completed by Navius Research (2023) for Clean Energy Canada, Canadian jobs in clean energy are predicted to grow 7% a year, from 509,000 in 2025 to 2.7 million in a net-zero 2050. Jobs in Alberta's clean energy sector are predicted to grow 10% per year out to a net-zero 2050—the fastest of any province or territory (Navius Research 2023). Alberta is well positioned with a skilled labour pool and strong balance sheet to bring nuclear power to the province.

The economic benefits of the Project are detailed in a 2024 report by the Conference Board of Canada. In this report, the economic benefits of deploying four (4) 1,000MWe-class CANDU MONARK reactors was assessed (CBC 2024). Although a macroeconomic assessment of the Project will be carried out as part of the socio-economic impact assessment, including a projection of number of jobs created in Alberta, the CBOC report describes the following economic benefits related to the deployment of the CANDU MONARK reactors:

- Gross Domestic Product (GDP) boost over the 70-year life of a 4-unit Project;
- A $40.9 billion boost to the Canadian GDP during construction and a $49.5 billion boost during operations;

- Deep integration with Canadian supply chains means that for every dollar spent GDP increases by $0.97. Including profit from the sale of electricity into the wholesale market increases this multiplier to $2.00;
- 33,500 full-time equivalent jobs per year over 9 years created during the construction of the four reactors. During the combined design and construction phases of the first deployment, 20,260 jobs per year on average will be created. The power plant will sustain 3,500 fulltime equivalent jobs per year over its 70-plus year operating life; and
- A $29.1 billion in additional tax revenue across all levels of government in Canada over the life of the Project.

A 4,000 MWe net increase of nuclear power that would add approximately 15% to Alberta's existing energy capacity, and 30% of future power needs.

The growth of nuclear power in Canada also provides opportunities for partnerships with Indigenous Nations and Communities. These partnerships can provide new economic opportunities, the ability to develop new technical skills, and the enhancement of business capacity (H. Exner-Pirot and J. McCormick 2024).

In addition to providing reliable power to Alberta, the CANDU reactor's ability to co-produce medical isotopes, such as Cobalt-60, Lutetium-177, Yttrium-90, Helium-3, and Molybdenum-99 can support the global healthcare sector by providing essential materials for diagnostic imaging, cancer treatment, and sterilization of medical supplies. This capability not only enhances the value proposition of the nuclear power plant but also contributes potential social benefits, making it a dual-purpose facility that benefits both energy and health sectors. This also provides an opportunity for the province of Alberta to gain independency and security of medical isotopes for the province's health sector. CANDU reactor is the only power reactor in the world able to co-produce life-saving medical isotopes. For example, Ontario Canada's CANDU reactors alone currently produce 50% of the world's supply of cobalt-60 which is used to sterilize 40% of the world's single-use medical devices. The CANDU reactor's online isotope harvesting system allows for extraction during power operations without any adverse impact on plant performance.

District heating is another potential benefit that the surrounding communities can take advantage of. For example, the Cernavoda Nuclear Power Plant in Romania is a two-unit CANDU6 nuclear facility that has been successfully supplying district heating for decades. The heat generated from the secondary water circuit is distributed through an extensive network of insulated water pipes to residential, commercial, and industrial buildings within the surrounding towns to supply hot water and space heating. This enables provision of consistent supply of heat, maintaining optimal indoor temperatures throughout the year while reducing reliance on fossil fuel, air pollutants, while lowering heating costs. This has the potential to create value added opportunities for intensive agriculture or other industrial activity near a nuclear power project in northern Alberta.

There are also various behind-the-meter nuclear power solutions that may be considered. Behind-the-meter involves generating electricity on-site using nuclear reactors to directly supply power to high-demand applications. Such solution could be implemented to provide electricity to the high-demand users during the off-peak hours without reducing the output of the nuclear power facility. There are potential cost savings by reducing extensive transmission infrastructure needs, keeping the operation at high capacity by generating round-the-clock energy, and providing additional economic opportunities. Some of the potential ideas include generation of green hydrogen using electrolysers, then storing or transporting it to the off-grid communities, co-location of data centers, and providing electricity to nearby high electricity demand facilities.

4.2 Impact Assessment Requirements

Impact Assessments are completed on projects identified as having the greatest potential for adverse environmental effects in areas of federal jurisdiction, and that are either listed as a "designated project" in the Physical Activities Regulations, or as "designated" by the federal Minister of Environment and Climate Change Canada (ECCC). The IAAC leads Impact Assessments for all designated projects under the IAA.

The Physical Activities Regulations define the physical activities that may be designated by the Government of Canada under the IAA. Section 27 of the Physical Activities Regulations identifies the following as a Designated Project, with respect to nuclear facilities:

> 27 *The site preparation for, and the construction, operation and decommissioning of, one or more new nuclear fission or fusion reactors if*
>
> *(b) that activity is not located within the licensed boundaries of an existing Class IA nuclear facility and the new reactors have a combined thermal capacity of more than 200 megawatts (thermal) (MWth).*

The Project has a proposed capacity of up to 4,800 Mwe, deriving from a combined thermal capacity of approximately 13,000 MWth (see Section 2.1), and will not be located on an existing nuclear site. Therefore, the Project is a "designated project" as described in subsection 27(b) of the Physical Activities Regulations [R-48].

In addition to the above, Section 28 of the Physical Activities Regulations identifies the following as a Designated Project, with respect to nuclear facilities:

> 28 *The construction and operation of either of the following:*
>
> *(a) a new facility for the storage of irradiated nuclear fuel or nuclear waste, outside the licensed boundaries of an existing nuclear facility, as defined in section 2 of the Nuclear Safety and Control Act, other than a facility for the on-site storage of irradiated nuclear fuel*

or nuclear waste associated with one or more new fission or fusion reactors that have a combined thermal capacity of less than 200 MWth;

(b) a new facility for the long-term management or disposal of irradiated nuclear fuel or nuclear waste.

The Project is therefore considered a "designated project" under Section 28 of the Physical Activities Regulations based on the fact that exclusion under 28 (a) is limited to facilities that are less than a combined thermal capacity of 200MWth.

4.3 Activities, Infrastructure, and Physical Works

The following activities, infrastructure, permanent or temporary structures, and physical works have been determined to be included in, and are associated with, at least one of the site preparation, construction, operation, and/or decommissioning phases of the Project. These phases are detailed in the following sections. Overarching all of these phases is the Integrated Management System (IMS).

4.3.1 Integrated Management System

An Integrated Management System (IMS) combines different management systems, such as quality, environment, engineering, procurement, and safety, into one unified framework. This approach makes processes more efficient and streamlined.

The IMS outlines how to implement compliance measures, continually improve processes, and promote a culture of health and safety. It includes program-level documents organized into categories that reflect the Canadian Nuclear Safety Commission (CNSC) safety and control areas and other regulatory interests.

To support the Project during the Integrated Assessment stage, the IMS includes the following elements:

- Supply Chain Management (including Contractor Oversight): Managing the supply chain and overseeing contractors.
- Site Evaluation: Assessing the suitability of the site.
- Engagement and Communication: Interacting with stakeholders and communicating Project details.
- Information/Document Management: Handling and organizing Project documents and information.
- Engineering and Design Authority: Overseeing engineering and design aspects.
- Project Management: Managing the overall Project.

- Performance Improvement: Continuously improving Project performance.
- Security: Ensuring the security of the Project.
- Human Resources: Managing personnel involved in the Project.

When applying for a Licence to Prepare the Site, additional elements are added to the IMS:

- Site Preparation: Preparing the site for construction.
- Environmental Management: Managing environmental aspects and impacts.
- Training: Providing training for personnel.
- Waste Management: Handling and disposing of waste.
- Safety Culture: Promoting a culture of safety within the Project.

As the Project progresses through future licensing stages, including construction, operations, and decommissioning, more elements will be added or revised. These may include:

- Interface Management: Managing interactions between different project components.
- Configuration Management: Controlling changes to the project configuration.
- Turnover: Managing the transition between project phases.
- Surveillance and Testing: Monitoring and testing project components.
- Maintenance and Ageing Management: Maintaining and managing the ageing of project components.
- Outage and Major Modification Management: Handling outages and major modifications.
- Nuclear Materials Safeguarding: Ensuring the security and control of nuclear materials.

In summary, the IMS provides a comprehensive framework that integrates various management systems to maintain efficiency, compliance, and continuous improvement throughout the Project's lifecycle.

4.3.2 Site Preparation

4.3.2.1 Activities

Once the License to Prepare Site is obtained, the following key activities will be undertaken as part of site preparation for the Project. This will also include the development of a detailed schedule so that all activities and infrastructure are undertaken and constructed in accordance with appropriate licensing requirements.

- Preparation of the License To Construct (LTC) application, including Preliminary Safety Analysis Report and other LTC supporting documents;

- Supply chain set-up and early contracting activities;
- Complete training material and planning, and design of training facilities, including simulator;
- Procurement and contracting of materials, equipment and services required for construction; and
- Initiate procurement of long-lead items for the plant.
- Land clearing;
- Site earthworks, including topsoil stripping and salvaging, grading, drilling, and excavations;
- Relocation or removal of existing structures and below-grade utilities;
- Blasting as required to prepare foundations of buildings;
- Preparation of temporary material laydown areas;
- Transportation of materials and equipment to site and temporary storage in laydown areas;
- Temporary onsite storage and management of materials and equipment;
- Operation of equipment, including cranes, heavy equipment and diesel generators;
- Temporary onsite fabrication facilities for production of concrete, structural steel members, piping, tubing, large cabling sections and conduits, and supporting components;
- Temporary onsite facilities for safe treatment, reduction and packaging of construction related waste (e.g., concrete washout);
- Management of conventional, hazardous waste generated by site preparation activities; and
- Deployment of environmental protection and mitigation measures, such as surface water run-off management, flood protection, and erosion controls.

4.3.2.2 Infrastructure – Non-Nuclear

Installation of non-nuclear infrastructure, foundations, and facilities including such things as:

- Installation of construction facilities for equipment assembly, warehouses, administration, and worker amenities;
- Excavations and tunnelling for the nuclear power plant buildings and facilities; and
- Excavations and installation of intake structures, piping and other facilities for the supply and storage of water to site.

4.3.3 Construction

The sequencing of the activities and construction infrastructure will be determined in further detail using engineering optimization processes and may not occur in the order presented below. This will include a detailed schedule so that all activities and infrastructure are undertaken and constructed in accordance with any appropriate licensing requirements.

4.3.3.1 Activities

The key activities undertaken as part of the site construction phase of the Project include the following:

- Continued procurement of all remaining nuclear power plant structures, systems, components, and materials;
- Civil and structural works for the foundations, including concrete pouring and reinforcement;
- Construction of the main plant buildings and all remaining supporting facilities;
- Installation of the nuclear structures, systems, and components (SSCs) and materials;
- Plan and conduct all required testing and inactive commissioning of all the nuclear SSCs to confirm they meet the required safety, functional, and performance standards;
- Prepare the License to Operate application, including development of the Final Safety Analysis Report and all supporting deliverables, to obtain the License to Operate (LTO) from the CNSC once the construction and commissioning works are completed;
- Prepare the comprehensive set of operational documentation, including operating procedures, maintenance programs and procedures, conduct of operations documentations, emergency and severe accident procedures, and emergency response plans; and
- Plan and prepare all required training programs, including for operations, maintenance, knowledge workers and contracting personnel; initiate training (note training of licenced operators and maintenance personnel must be complete prior to the LTO being granted).

4.3.3.2 Infrastructure – Non-Nuclear

Non-nuclear infrastructure for the Project includes the construction of:

- Permanent onsite and offsite roads or improvements, as required;
- Installation of on-site services and utilities, permanent for the plant as well as temporary additional facilities for construction, including:
  - communication infrastructure and systems, including internet and local area networks;
  - power supply and distribution;
  - natural gas pipeline; and
  - potable and sewer water management facilities;

- Permanent stormwater pond for stormwater management, dewatering and drainage facilities;
- Permanent water intake and processing infrastructure, including screenhouses, pumphouses and storage ponds;
- Permanent turbine building and installation of turbine generators for electricity production;
- Permanent security infrastructure, including fencing, lighting, and monitoring to protect the security of the site;
- Temporary concrete batch plant and crusher plant;
- Permanent maintenance hot and cold shops, and inspection facilities;
- Permanent laboratories and testing facilities;
- Permanent standby and emergency power supply generators;
- Permanent high-voltage transmission switchyard, including connections to power plant generator, as well as any interconnection infrastructure required to connect to the new 500kV provincial power transmission network;
- Permanent water storage ponds and fire protection water storage tanks;
- Permanent facilities for the management and storage of conventional waste including hazardous materials;
- Permanent warehouse facilities and laydown areas;
- Permanent underground infrastructure to support servicing the site (e.g., water, sanitary);
- Permanent ancillary facilities including parking lots (partially electrified, and unpaved), weigh scales, and weather station;
- Permanent administration building housing offices and other supporting functions;
- Permanent emergency response facilities for emergency preparedness;
- Permanent onsite training facilities with simulator; and
- Temporary worker's accommodations.

4.3.3.3 Infrastructure – Nuclear

Nuclear infrastructure includes construction of or other work related to:

- Permanent piles and foundations for reactor buildings and other structures;
- Construction of the permanent main plant structures including the reactor and reactor auxiliary buildings;

- The installation of the permanent nuclear reactor systems, including the electrical systems, cooling systems, safety systems, instrumentation and control, and connection with the cooling water supply infrastructure;
- Permanent control room and remaining support buildings;
- Permanent facilities for the management and storage of low- level and intermediate level radioactive waste; and
- Permanent facilities for the management and storage of used fuel.

4.3.4 Operations

The operations phase of the Project includes the activities and infrastructure detailed in the following sections. Licensing phases applicable to operations include Licensing Phase 3: Licence to Operate, which must be received prior to first fuel load and active commissioning.

4.3.4.1 Activities

The operation phase of the Project will include the following key activities:

- Confirm all personnel have undergone full training and are qualified for their roles, with continuous training programs in place;
- Nuclear (active) commissioning, including removal of guaranteed shutdown state, fuel loading, reactor startup and criticality testing, power escalation testing (e.g., critical and lower power, higher power, and commercial operation) and extensive testing of safety systems and reactor performance;
- Completion of an operational readiness review to confirm that the plant is ready for safe operations including:
  - Safety analysis monitoring and fitness for service program;
  - Emergency preparedness, including the implementation of emergency response plans and facilities;
  - Implementation of security measures;
  - Continuous monitoring of radionuclide and non-radionuclide levels within and around the Project site;
  - Initiation of material safeguarding activities, such as fuel loading and handling irradiation;
- Regular inspection and maintenance of Project components and systems;
- Operation of primary and secondary/tertiary heat transport systems;
- Operation of cooling system infrastructure, including intakes, pumping systems, storage pond management, pipelines, draft cooling infrastructure (cooling towers), and water treatment and release;

- Operation of turbines for electrical generation;
- Operation of electrical power systems, including transformers, diesel generators, and emergency power;
- Operation of services and utilities, including sewage, stormwater, and domestic water services;
- Operation of safety and security systems, including emergency response systems, first aid stations, health check areas and on-site fire watch station;
- Operation of radiological laboratories to support routine monitoring and to categorize waste materials for proper processing;
- Provide permanent facilities for the management and storage of operational nuclear waste and used fuel, including on-site facilities for used fuel waste and provisions for packaging for eventual off-site long-term disposal; and
- Segregated management and storage of operational conventional, hazardous and low-level radioactive waste and operational intermediate and high-level nuclear waste.

4.3.4.2 Infrastructure

The infrastructure for the operations of the Project will include:

- Temporary and/or permanent structures and logistics infrastructure to support outage inspection and maintenance program activities; and
- Temporary and/or permanent structures and logistics infrastructure to support life extension (refurbishment and retube) activities.

4.3.5 Decommissioning

A Preliminary Decommissioning Plan (PDP) will be developed in early site licensing, prior to LTC application, and will be in place throughout the Project phases to effectively plan and execute the decommissioning activities. Prior to the execution of decommissioning, the PDP will be converted into a Detailed Decommissioning Plan, with all content updated to outline the specific steps, timelines, resources, and costs required for the site decommissioning process. The Detailed Decommissioning Plan will be submitted to CNSC for review and approval prior to any decommissioning activity being undertaken. This will provide an efficient transition from active operation to final closure and release from regulatory control, confirming that regulatory requirements have been met.

CNSC will be notified in writing prior to the shutdown of the facility. The timing of the decommissioning and the proposed decommissioning activities, applicable regulations and other considerations will be discussed with CNSC. The necessary permits and regulatory approvals are then obtained before commencing decommissioning activities. Note that as per the Project Schedule in Section 4.5.1, due to the staged commencement of commercial operations for each reactor unit, it is expected that decommissioning will also proceed in a staged manner, with the first operational unit commencing decommissioning first.

The licensing phases applicable to decommissioning are Licensing Phase 4: Licence to Decommission and Licensing Phase 5: Licence to Abandon.

4.3.5.1 Activities

The decommissioning phase of the Project includes the following key activities:

- Defueling program and completion of post-operational clean out of radioactive inventory to enable immediate decommissioning as the preferred strategy;
- Support systems shutdown;
- Used fuel handling and transfer to dry storage on-site in preparation for shipment to off-site disposal;
- Dismantling and decontamination of reactors, structures, components, and support systems in accordance with decommissioning program and waste management plan;
- Removal of surface contamination from facilities and equipment;
- Reclamation planning and closure of the site;
- Safe storage of all radioactive and non-radioactive waste in appropriate off-site facilities in accordance with regulatory requirements;
- Transport of radioactive waste to long-term storage/disposal site;
- Ongoing decommissioning, demolition, reclamation, restoration, and abandonment activities for temporary and permanent structures to achieved desired end state of site and enable future reuse of the site;
- Restoration and remediation of the site to a condition suitable for alternative land use; and
- Application for the Licence to Abandon site once it can be demonstrated that the site no longer poses any radiological risk.

4.3.5.2 Infrastructure

The decommissioning phase of the Project will include the following infrastructure:

- Temporary facilities to support waste management, demolition, and abandonment; and
- Temporary laydown and security-fenced areas for use while conducting the decommissioning activities.

4.3.6 Labour Force

The Project construction workforce is estimated to be up to 5,000 workers at peak and the full operations workforce is estimated to be 2,700 workers, including indirect contractors. Expanded regional activity will benefit local residents—as economies grow and diversify, both public and private sector services also tend to grow and diversify. However, increased activity levels could put some upward pressure on wages and prices and cause some other disruptions in local markets.

4.4 Project Production Capacity and Process

The Project is estimated to have a production capacity of up to 4,800 MWe deriving from approximately 13,000 MWth. It is proposed to deploy four (4) 1,000MWe-power class CANDU MONARK reactors, with a total gross capacity of approximately 4,400 MWe. This is within the Project overall licensed capacity, allowing for any optimizations of the design for this site and potential future enhancements to optimize power output.

4.4.1 Maximum Production Capacity

Based on currently estimated design parameters, each individual CANDU MONARK reactor produces a core thermal power output of approximately 3,000 MWth giving a total combined thermal capacity of 12,000 MWth for all four units. Note that these values are approximate and subject to change as the design is finalized for the site. The final output will be dependent on cooling water conditions at the site and the net output can be optimized by adjusting turbine and condenser design to suit site conditions, as well as by optimizing “house loads” (i.e., the electrical power required by the plant itself. Table 4.4-1 provides key production-related data for the 4-unit MONARK plant.

Table 4.4-1: Maximum Production Capacity for the Project

Description	Unit of Measure	MONARK Date
REACTOR		
Core thermal power (generic)	MWth	3,000*
Calandria shell inside diameter	mm	8,500*
Number of fuel channels (generic)	Qty	480

Table 4.4-1: Maximum Production Capacity for the Project

Description	Unit of Measure	MONARK Date
FUEL		
Reference equilibrium core-average fuel discharge burn-up	MWd/MgU	7,800*
Number of elements per bundle	Qty	37 (or 43 for CANFLEX fuel)
Fuel bundle length	mm	500*
Bundles per fuel channel	Qty	12
CONTAINMENT		
Type	N/A	Pre-stressed concrete with steel liner
TURBINE GENERATOR		
Gross/net electric output	MW(e)	1,100†*/1,000‡*
Gross turbine generator efficiency	%	35*

Notes:
mm – millimetres; Qty – quantity; MWd/MgU - Megawatt-day per metric ton uranium.
* Values approximate and preliminary.
† Gross electrical output depends on cooling water temperature, cooling cycle, the turbine generator and condenser design.
‡ Net electrical output depends on electrical loads used by the plant itself.

4.4.2 Production Process Description

The deployment of the CANDU MONARK is proposed for the Project. This next-generation CANDU reactor is the newest model currently in development, based on the design, operating experience, and the best features of the 31 predecessor commercial CANDU reactors built around the world. CANDU technology, a Canadian innovation developed by Atomic Energy of Canada Limited in the 1950s, is owned, manufactured, and designed in Canada. This technology has been deployed both domestically and internationally as shown in Table 4.4-2.

Table 4.4-2: Commercial CANDU Reactors Built Globally

Name	CANDU Model	Location	Capacity MW(e) (Gross)	In-Service Date
Pickering 1	CANDU-500	Canada	542	1971
Pickering 2 *	CANDU-500	Canada	542	1971
Pickering 3 *	CANDU-500	Canada	542	1972
Pickering 4	CANDU-500	Canada	542	1973
Bruce 1	CANDU 791	Canada	825**	1977
Bruce 2	CANDU 791	Canada	825**	1977
Bruce 3	CANDU 750A	Canada	805**	1978
Bruce 4	CANDU 750A	Canada	805**	1979
Point Lepreau	CANDU® 6	Canada	680	1983
Gentilly-2 *	CANDU® 6	Canada	675	1983
Wolsong 1*	CANDU® 6	South Korea	679	1983

Table 4.4-2: Commercial CANDU Reactors Built Globally

Name	CANDU Model	Location	Capacity MW(e) (Gross)	In-Service Date
Embalse	CANDU® 6	Argentina	648	1984
Pickering 5	CANDU-500	Canada	540	1983
Pickering 6	CANDU-500	Canada	540	1984
Pickering 7	CANDU-500	Canada	540	1984
Pickering 8	CANDU-500	Canada	540	1986
Bruce 5	CANDU 750B	Canada	840	1985
Bruce 6	CANDU 750B	Canada	870	1984
Bruce 7	CANDU 750B	Canada	840	1984
Bruce 8	CANDU 750B	Canada	840	1987
Darlington 1	CANDU 850	Canada	935	1990
Darlington 2	CANDU 850	Canada	935	1989
Darlington 3	CANDU 850	Canada	935	1991
Darlington 4	CANDU 850	Canada	935	1992
Cernavoda 1	CANDU® 6	Romania	706	1996
Wolsong 2	CANDU® 6	South Korea	715	1997
Wolsong 3	CANDU® 6	South Korea	715	1999
Wolsong 4	CANDU® 6	South Korea	715	1999
Qinshan 1	CANDU® 6	China	728	2002
Qinshan 2	CANDU® 6	China	728	2003
Cernavoda 2	CANDU® 6	Romania	706	2007

* Unit is no longer in operation.

** Electrical equivalent (electricity plus process steam).

4.4.2.1 The CANDU MONARK

The MONARK design builds on the knowledge and experience from existing operational CANDU nuclear power plants. It offers improvements in cost, safety, and performance, while keeping the advantages of the current fleet of CANDU plants, notably its passive and inherent safety features and its online capacity factor (i.e., amount of time it is actively generating electricity for the grid).

Like all CANDU reactors, the MONARK uses a modular horizontal fuel channel surrounded by a heavy water moderator. Its main innovation is modularization, which reduces construction time. The reactor is designed for easy maintenance, with enhanced health monitoring, making the plant more reliable. The entire plant, including the instrumentation and controls for normal operations benefit from the use of an integrated and enhanced digital strategy for selection and implementation of the platforms and networks used. These improvements are supported by existing knowledge and build on the traditional CANDU system features, like the simple fuel bundle

design, on-power fuelling, and a separate low-temperature, low-pressure moderator with a backup means to provide cooling to the cooling water systems.

Online refuelling is a distinctive feature of CANDU reactors, allowing them to be refuelled while operating at full power. This capability enhances the reactor's efficiency and availability, as it eliminates the need for lengthy shutdowns during refuelling. This is a considerable operational advantage over other reactor types that require periodic shutdowns for refuelling. For oil and gas operations, data centres, and other industrial uses, this is particularly beneficial as it eliminates the need for grid power during refuelling outages, ensuring continuous operations.

The MONARK enhances safety margins and reliability, making plant operations easier and improving overall safety. It builds on proven safety systems of existing CANDU plants, such as the two independent shutdown systems, and adds new passive safety mechanisms.

The capacity factor measures the actual output of a power plant compared to its maximum possible output. CANDU reactors' annual capacity factor is well over 90%. For example, in 2024, the Pickering Nuclear Generation Station maintained a Unit Capacity Factor of 95.8%, and Cernavoda Unit 2's capacity factor was 93.6% in 2024. Online refuelling capability is only available with CANDU reactors, enabling stable supply of electricity.

4.4.2.2 Plant Design

The major nuclear systems of a MONARK plant are in the reactor building and the reactor auxiliary building (Figure 4.4-1). These nuclear systems include the following (Figure 4.4-2):

- Reactor assembly, consisting of a calandria with 480 channels of natural uranium fuel contained in the 37M (or CANFLEX) fuel bundle;
- Heat transport system with heavy water coolant in a two loop, figure-of-eight configuration with four steam generators, four heat transport pumps, four reactor outlet headers, and four reactor inlet headers;
- Fuel handling system, which includes two fuelling machines, each mounted on a fuelling machine bridge and columns, found at both faces of the reactor;
- Safety systems and complementary design features, including two shutdown systems, emergency core cooling system, emergency feedwater system (also referred to as the emergency heat removal system), containment system and associated safety support systems, Severe accident heat removal and recovery system and emergency containment filter venting system;
- Spent fuel handling and storage systems, including used fuel transfer system, spent fuel storage pond with capacity to store 10 years of spent fuel before dry fuel storage is required, spent fuel drying and container-loading facilities, and spent fuel dry storage container facilities; and

- Waste handling and storage systems (radioactive and non-radioactive) including waste sorting and assaying systems, processing and packaging facilities for safe offsite transport and onsite storage, and interim onsite radioactive waste storage, as required depending on availability of an offsite nuclear waste management installation.

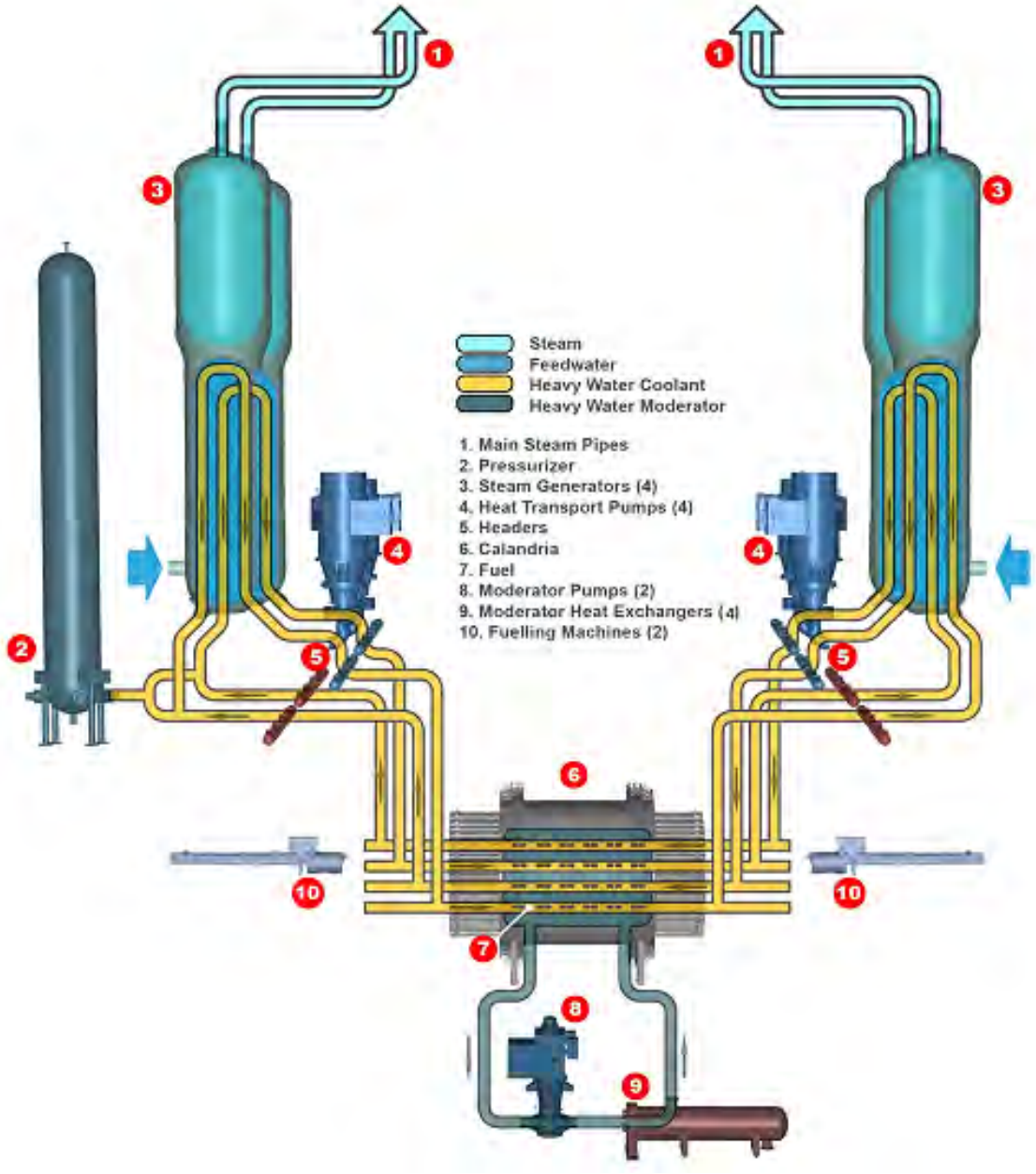


Figure 4.4-1: MONARK Nuclear Systems Schematic

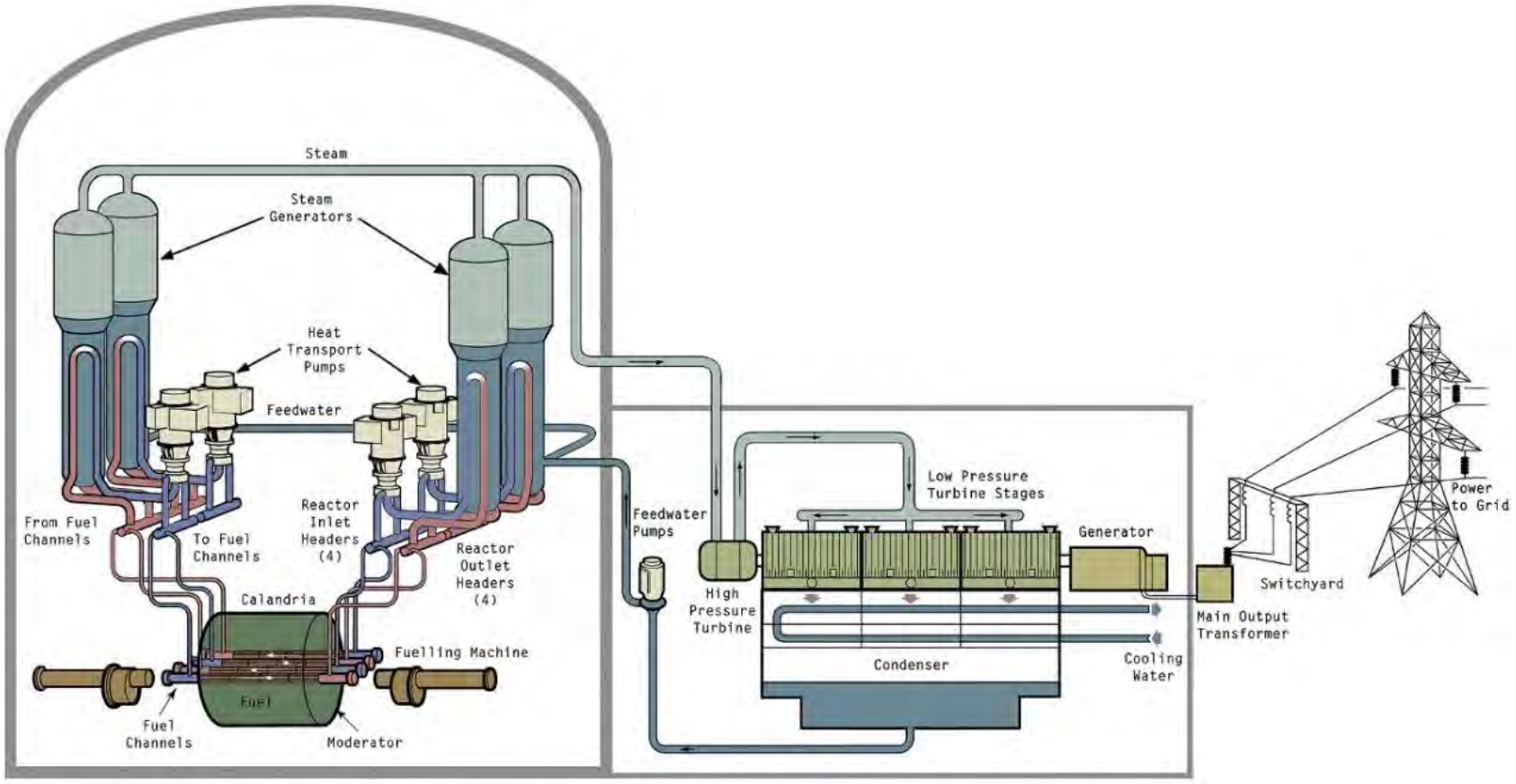


Figure 4.4-2: MONARK Reference Plant Arrangement

4.4.2.3 Site Design Data

All buildings and structures important to safety are designed to accommodate a wide range of site characteristics including seismic conditions, geotechnical parameters, and metrological conditions.

4.4.2.3.1 Site Cooling Water Infrastructure

Cooling tower systems are proposed to be used for the Project. A once-through cooling water system is not workable for either of the potential sites since it is not acceptable to return that large amount of warmer water to the Peace River. The water supply from the Peace River is expected to be sufficient in providing adequate make-up water for the cooling water system losses through evaporation and blowdown drift. Currently a mechanical draft cooling tower design is proposed, however, additional studies are being completed to confirm the best available technology and design.

Each MONARK unit will have two (2) dedicated 'banks' of cooling tower systems and loops. One (1) bank acts as the "Normal Heat Sink" loop and one (1) is the "Essential Heat Sink" loop. The Normal Heat Sink loop will service the condenser and plant service cooling water systems during normal operation. Essential Heat Sink loop will serve the safety-classified essential service water systems during normal and emergency operations. The two loops will be separated and the Essential Heat Sink loop components, process piping and instrumentation suitably protected appropriate to its safety class. The cooling water in both the steam generator/condenser loop within the plant or in the site cooling water systems and components is not radioactive and will not be exposed to radioactive substances. The site cooling water infrastructure diagram is shown on Figure 4.4-3.

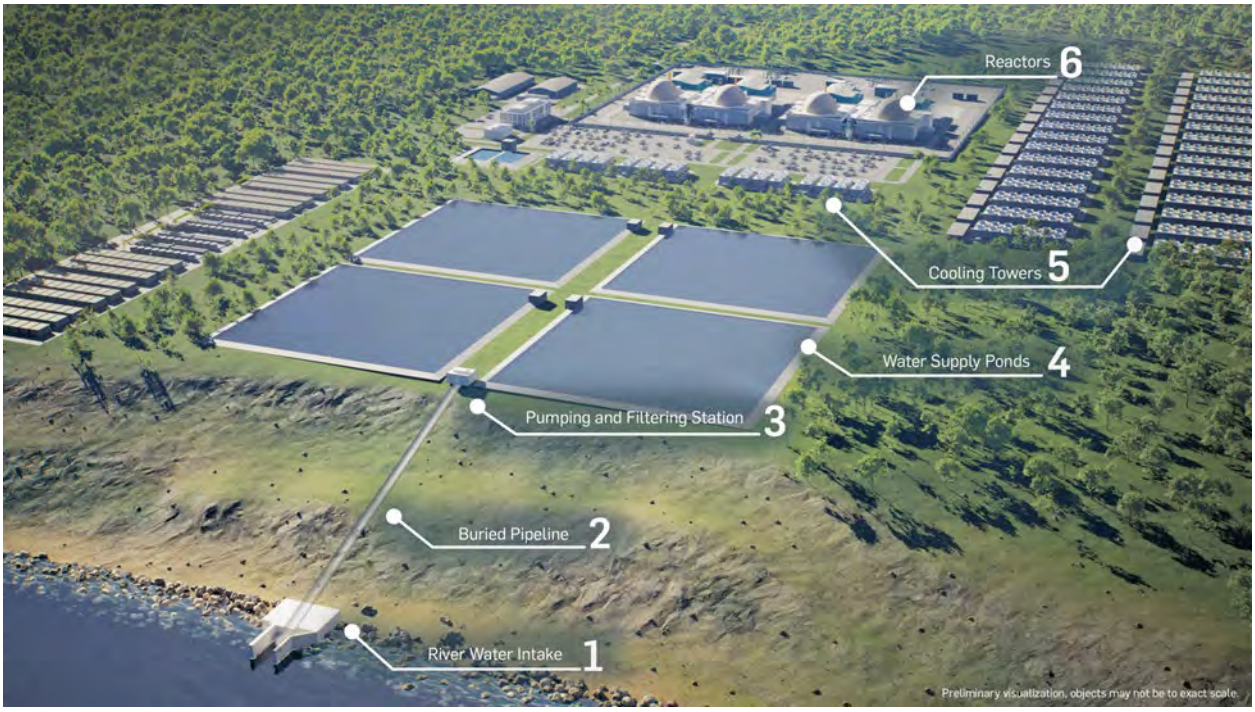


Figure 4.4-3: Site Cooling Water Infrastructure Diagram

Figure 4.4-4 provides a schematic of the site cooling water system process outside of the reactor power block. Warm water from the plant condensers, plant service cooling water system heat exchangers, and essential service water from the reactor is pumped to the cooling tower cells. Ambient air is drawn upward to cool the water. Water in the closed loop is checked for quality and treated to minimize fouling. As the water evaporates to the atmosphere, a blowdown stream is drawn off to support proper control of water chemistry. Fresh water make-up is continuously supplied to support the optimum water level and quality within the plant.

The make-up water requirement[1] is estimated to be a maximum of 1,300 L/s per MONARK unit, with normal expected usage to be approximately 1,025 L/s. This includes approximately 1,200 L/s (maximum)/1,000 L/s (normal expected) in the Normal Heat Sink loop and approximately 100 L/s (maximum)/25 L/s (normal expected) in the Essential Heat Sink loop, per MONARK unit. To support this water requirement, while protecting the Peace River water levels, water reservoirs are currently designed into the site layout. One (1) water reservoir per MONARK unit will supply both Normal Heat Sink and Essential Heat Sink make-up water. There will also be a connection from each reservoir to the fire water system which will serve all buildings and facilities; this system is estimated to need an additional 70 L/s but only when in use (i.e., in the unlikely chance of an on-site fire).

[1] Note that all site water usage requirements are preliminary only and will be calculated and finalized as the site-specific design is developed throughout the Project phases.

Each reservoir will have a capacity of approximately 2.5 million m^3. This volume will supply up to 1,350 L/s of water per unit over a 21-day period to support make-up water requirements for maximum Normal Heat Sink, Essential Heat Sink, and fire protection water needs. The reservoirs will be interconnected for both filling and supply to the water systems; this provides backup supply should any one reservoir or its filling and supply pipework have a fault. This reservoir capacity includes sufficient margin for this stage of the Project. The volume will be confirmed as technical and Project details evolve.

There will be two additional smaller reservoirs on the site that will supply the Severe Accident Recovery and Heat Removal System (SARHRS) water. Each SARHRS reservoir services two units. Combined, these two reservoirs will have the capacity required to support the required mission period determined for the SARHRS system through accident progression and safety analysis. Note that SARHRS is only ever needed during severe accidents, which are not realistically expected during the lifetime of the plant. As with the Normal and Essential cooling system make-up water, these reservoirs will be interconnected to provide redundancy. The volume will be confirmed as technical and Project details evolve.

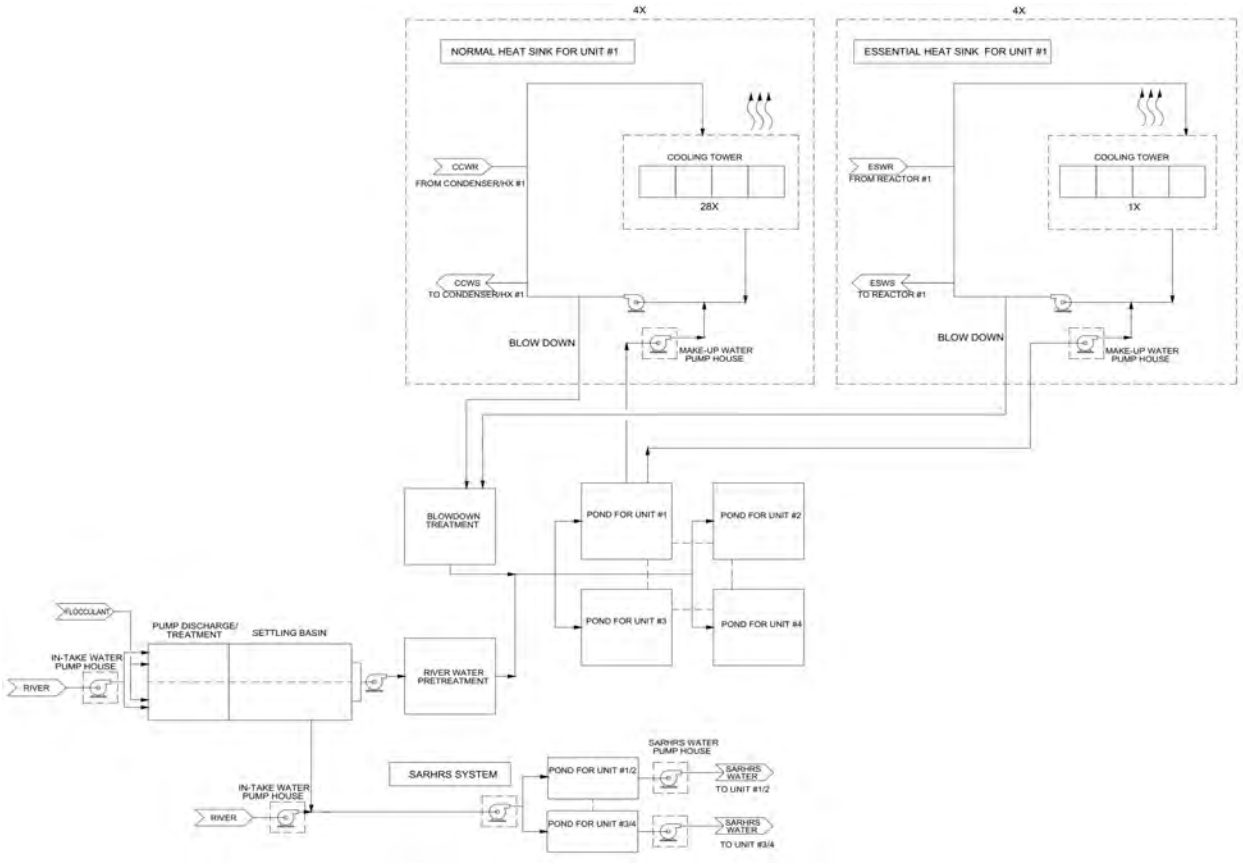


Figure 4.4-4: Cooling Water System Schematic

4.4.2.3.2 Design Basis Earthquake

The design basis earthquake is an engineering representation of the potential earthquake with the most severe effects applicable to the site, that has sufficiently low probability of being exceeded during the lifetime of the plant. The MONARK reactor standard plant is designed for a design basis earthquake based on current generic seismic data. Detailed analysis of the site will confirm whether any site-specific design adjustments are necessary to accommodate local seismic phenomena.

4.4.2.3.3 Tornado Protection

Tornado protection is supplied for structures important to safety. The design basis tornado is defined by a maximum wind speed and a maximum air pressure drop suitable to be considered conservative and bounding. The MONARK reactor is designed to sustain this worst-case tornado condition with no system failures.

4.4.2.3.4 Exclusion and Emergency Planning Zones

To keep radiation exposure to the public within safe, allowable limits, all nuclear reactor sites in Canada are required to have an exclusion zone, also known as an exclusion area boundary (EAB). The EAB is required by the CNSC to accommodate requirements for evacuation, land usage, security, and environmental factors. The land within the EAB must be under the ownership and control of the site licence holder and all unauthorized persons are restricted from this zone. The MONARK plant is designed to be suitable for a site with a minimum exclusion zone of 500 m around each reactor building. This zone will be within the licenced site boundary fence.

In addition to the exclusion zone or EAB, all nuclear power plants are surrounded by larger controlled areas that dictate the actions to be taken during the highly unlikely event of an offsite release due to a severe accident. They allow for effective emergency management and protection of the public from potential radiation doses in highly unlikely accident conditions that must nevertheless be planned for. These emergency planning zones (EPZs) are defined by, and their sizes agreed with the provincial and municipal emergency response planning organizations during the licensing phases. The sizes of these planning zones are calculated based on the technology, safety systems design, and accident progression analysis that is specific to each plant type and location.

Alberta does not currently have nuclear power, so these zones are not defined yet. As an example, the Province of Ontario Provincial Nuclear Emergency Response Plan (PNERP) Master Plan (Ontario 2024) defines the following zones for nuclear facility emergency planning. Note that the actual zonal sizes and boundaries for each designated nuclear installation are specified in the relevant site-specific implementing plans of the PNERP.

- **Automatic Action Zone (AAZ):** The zone immediately surrounding the reactor facility where pre- planned protective actions are to be implemented by default based on reactor facility conditions with the aim of preventing or reducing the occurrence of severe accident effects off-site. These are mostly response actions for on-site plant personnel.
- **Detailed Planning Zone (DPZ):** The zone immediately surrounding and if necessary (depending on the event progression), encompassing the AAZ where pre-planned protective actions are implemented as needed based on reactor facility conditions, dose modelling, and environmental monitoring. An increased level of emergency planning and preparedness is undertaken within this area because of its proximity to the potential hazard.
- **Contingency Planning Zone (CPZ):** The zone around a nuclear installation beyond the DPZ where contingency planning and arrangements are made in advance, so that during a nuclear emergency, protective actions can be extended beyond the DPZ as required to reduce potential for exposure. Generally, this is the zone for which planning and preparedness is carried out to confirm there are measures against exposure to a radioactive plume.
- **Ingestion Planning Zone (IPZ):** The zone around a nuclear installation within which it is necessary to plan and prepare measures against exposure from the ingestion of radioactive material. Specifically, the IPZ is a pre-designated area surrounding a reactor facility where plans or arrangements are made to:

  a) protect the food chain

  b) protect drinking water supplies

  c) restrict consumption and distribution of potentially contaminated produce, wild-grown products (including mushrooms and game), milk from grazing animals, rainwater, animal feed

  d) restrict distribution of non-food commodities until further assessments are performed

For existing reactors in Canada, because the plants are largely the same design, the zones were consistently defined and sized by the relevant local and provincial organizations. However, the same sizes of the zones are not expected to be required for new modern reactor designs. In particular, for modern nuclear power plant designs, technology improvements have been made that incorporate more features such as passive and inherent safety systems to "practically eliminate" core melt and offsite releases. With this claim, certain emergency response planning requirements would be eliminated, as is the need for several provisions to mitigate the consequences from certain more critical event conditions.

Per the CNSC (CNSC 2015):

> *"There are no legislative or regulatory requirements for EPZ sizing in Canada and therefore no restrictions currently in place on minimum EPZ size. EPZ and other planning actions should be undertaken in relation to the risks associated with the specific technology. As such, results from safety analyses (i.e., the probabilistic safety analysis) in combination with the protection strategy used by offsite planners will determine the EPZ size. This is consistent with the overall methodologies documented by the IAEA."*

As the site-specific design stage progresses, the required zones for the Project are expected to be calculated, with analysis justifying their sizes, and agreed with the province of Alberta and local municipal emergency planning organizations.

4.4.2.4 Site Layout

A conceptual visualization of four CANDU MONARK reactors configured as a pair of twin units is shown in Figure 4.4-5.

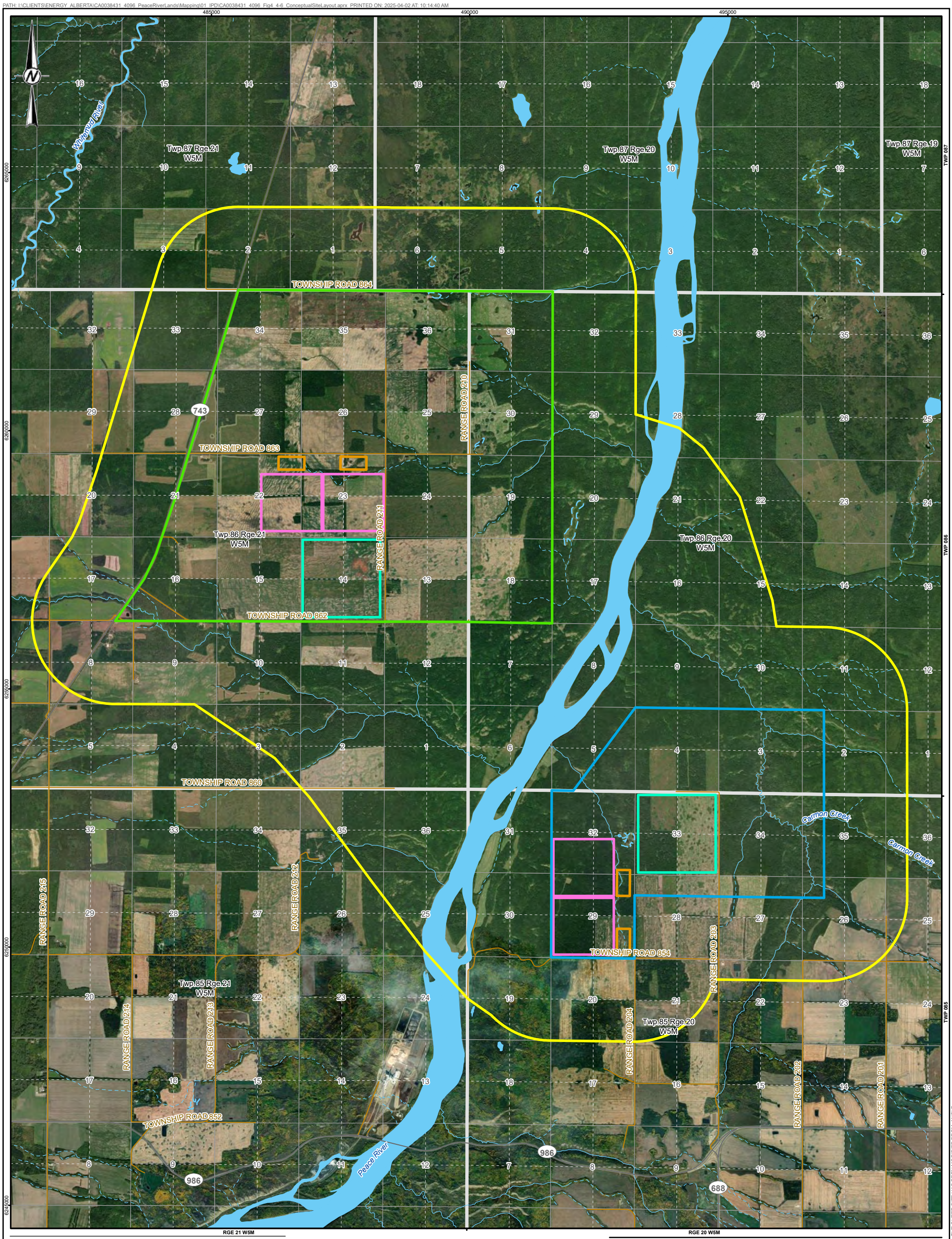
Figure 4.4-5: Peace River Nuclear Power Project MONARK Plant Visual Representation

The major buildings and structures and proposed site boundary associated with the overall site arrangement for the two twin-unit arrangement are shown in Figure 4.4-6. The basic arrangement of the power block consists of reactor buildings, reactor auxiliary buildings, turbine buildings, service building, main control building, maintenance building, and safety diesel generator buildings as shown in Figure 4.4-7 and Figure 4.4-8. The main plant facilities for each twin-unit of the plant are listed below, with quantities shown in parentheses if more than one.

- Reactor Buildings (2);
- Reactor Auxiliary Buildings (2);
- Turbine Buildings (2);
- Main Control Building;
- Service Building;
- Maintenance Building*;
- Plant Service Water and Condenser Cooling Water Pumphouse;
- Essential Service Water Pumphouse;
- Diesel Generator Buildings (a total of five buildings, of which four have safety support functions);
- Main Switchyard;
- Water Treatment Facility*; and
- Auxiliary and Ancillary Structures*.

*Note: The reference MONARK plant is comprised of a single twin-unit plant which shares some common systems, marked with * in the list above. The proposed four-unit (i.e., a pair of twin-units) configuration for the Project will allow for further sharing of services and optimization. Optimal sharing of common buildings such as maintenance buildings, storage and systems such as the water treatment plant, liquid treatment, gas systems will be designed into the four-unit MONARK site.*

The land boundary options for the Project site are proposed but are not finalized at this time. A four-unit MONARK plant layout will require a minimum boundary dimension of approximately 1.6 km x 4.0 km (1.0 mile x 2.5 miles). The proposed parcel of land accommodates this boundary, which includes the EAB (i.e., exclusion zone; Figure 4.4-7). An alternative suggested site layout showing the plant main power generating buildings rotated into a north-south orientation on the same minimum land area is shown for information and comparison purposes only in Figure 4.4-9. This alternative might be preferred depending on the final location of the grid and municipal road connections. As the site-specific design progresses and the land available and dedicated to the Project has been finalized, the actual site layout will be finalized. The final site layout will take into account key criteria for optimizing site layout with specific placement of the various plant facilities that takes into consideration site-wide environmental and radiological safety, plant performance, and security and safeguarding.



LEGEND

- SECONDARY HIGHWAY
- LOCAL ROAD
- WATERCOURSE
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- PROJECT SITE / CONSULTATION BUFFER
- WATERBODY

CONCEPTUAL SITE LAYOUT

- MAIN INFRASTRUCTURE (1170 m x 1100 m)
- SWITCH YARD (250 m x 500 m)
- WATER SUPPLY POND (1500 m x 1500 m)

0 1,250 2,500

1:70,000 METRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
INDICATIVE CONCEPTUAL SITE LAYOUT

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MS
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO. CA0038431.4096 | CONTROL | REV. 0 | FIGURE 4.4-6

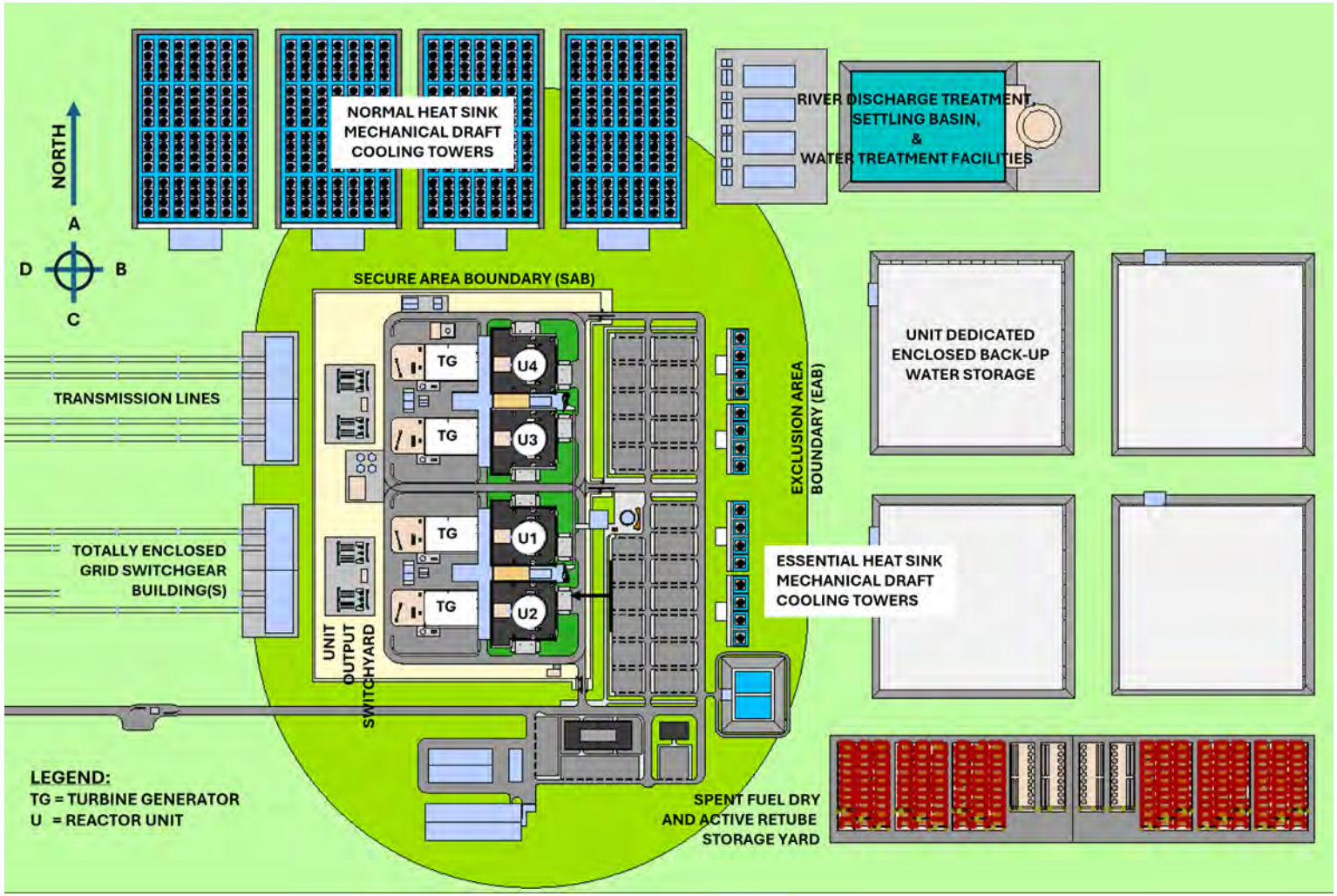


Figure 4.4-7: Four Unit MONARK Site Arrangement

Note: overlaid on 640 hectare (1 mile x 2.5 mile) grid based on the Alberta Township Survey system used to define legal land descriptions.

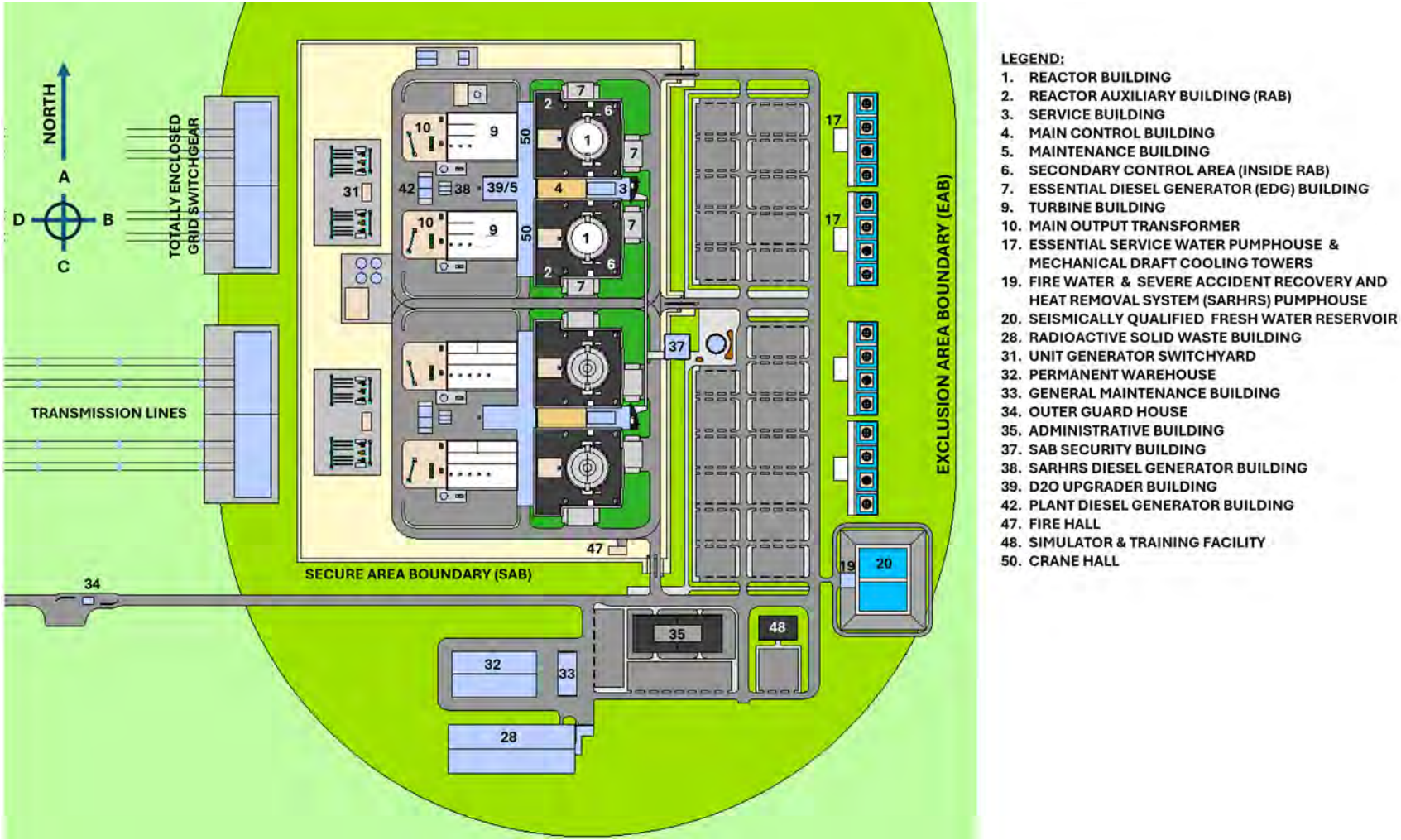


Figure 4.4-8: Four Unit MONARK Arrangement Close-up and Main Facilities Legend

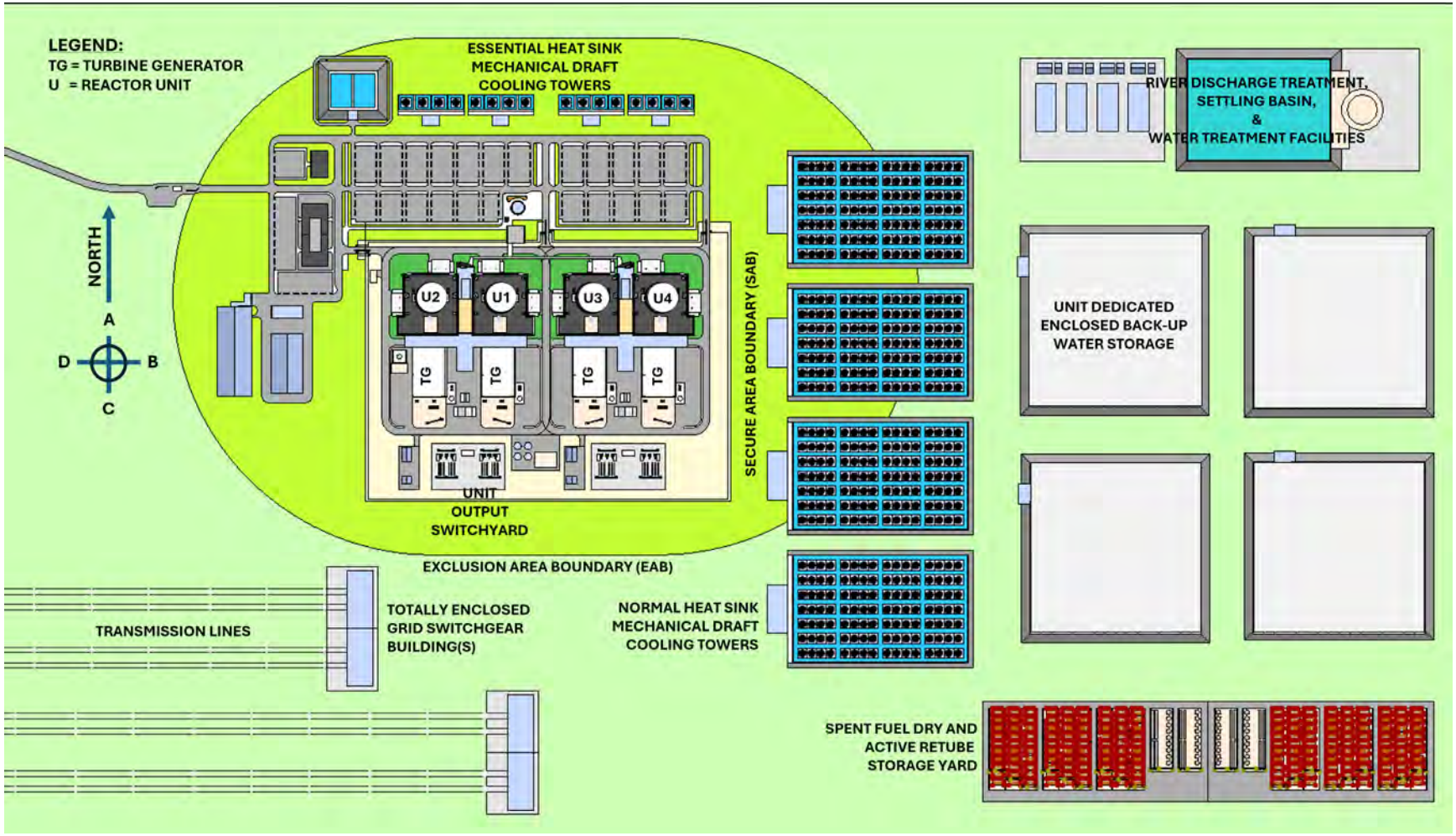


Figure 4.4-9: Four Unit MONARK Alternate Arrangement – Power Block Rotate 90 Degrees

4.5 Preliminary Project Timelines

4.5.1 Project Schedule

The base case for the Project contemplates the sequential construction of all four units as shown in the Overall Project Schedule (Fig 4.5-1). The timing of units 3 and 4 will be assessed during the execution of the Project, and such timing may change based on the future provincial power demand and economic climate.

The schedule below, for the purpose of the Impact Assessment, shows the execution of the Project for the development of four consecutive units as the bounding case for the Impact Assessment. The Project is expected to take approximately 10 to 12 years from Project start to operation of the first unit with the subsequent units coming online approximately 3 years after one another based on current average estimates for the various stages. Operation is anticipated to occur for approximately 70 years per unit plus 20 years to decommission the units and abandonment thereafter.

The schedule shown in Figure 4.5-1 is based on the presently projected mean duration for building four CANDU MONARK units. It assumes that each unit will be constructed consecutively without any interruptions or pauses, including those for grid infrastructure upgrades. It also anticipates meeting a three-year federal government target to complete the Integrated Assessment and securing the necessary financing at the appropriate time. The Project schedule is subject to change.

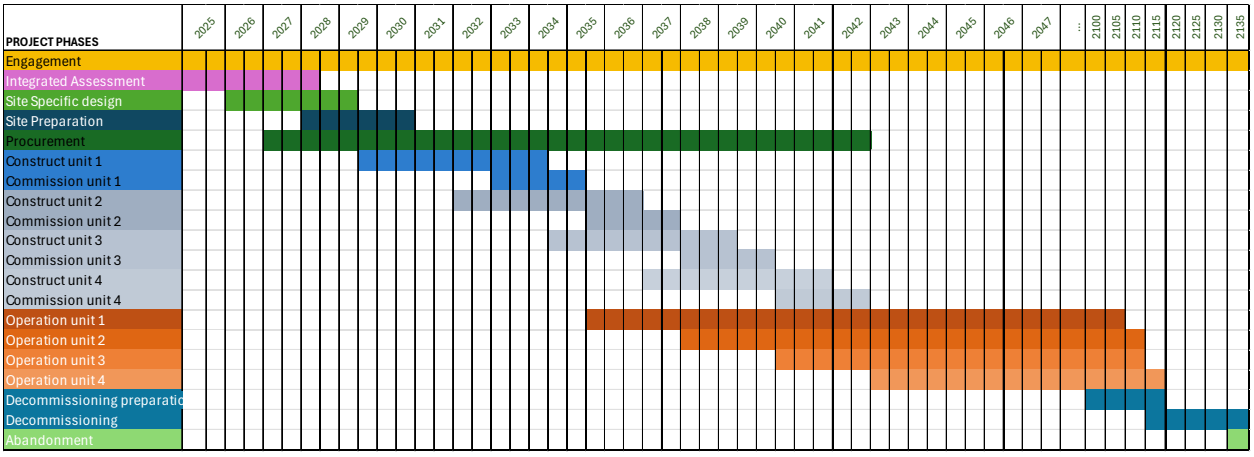


Figure 4.5-1: Overall Project Schedule

4.5.2 Project Stages

The Project stages are based on an estimated average duration that are expected for this Project.

Integrated Assessment
Approximately 3.5 years (2025 – 2028)

- Initial Planning
- Site Selection
- Impact Assessment
- Licensing Phase 1: Obtain Licence to Prepare Site

Site Preparation
Approximately 3 years (2028 – 2030)

- Site Preparation
- Licensing Phase 2: Obtain Licence to Construct

Construction
Approximately 11-13 years (2029– 2041)

- Construct and Commission Units
- Licensing Phase 3A: Obtain Licence to Operate

Operation
Approximately 70 years per unit (2035 – 2115)

- First Fuel
- Licensing Phase 3B: Maintain Licence to Operate
- Plant Operation
- Fuel Safe Storage

Decommissioning
Approximately 20 years (2115 – 2135)

- Licensing Phase 4: Obtain Licence to Decommission
- Decommission Facilities

Abandonment
Thereafter

- Licensing Phase 5: Obtain Licence to Abandon

4.6 Alternative Means of Carrying Out the Project

"Alternative means", is defined by the IAAC as the various projects that are technically and economically feasible, including using best available technologies, and the effects of those means. There are several alternative means that are being considered for carrying out the Project. These alternatives will be identified as the planning and design of the facility proceeds. The Impact Assessment for the Project will play a major part in identifying the preferred alternative means. Currently, it is anticipated that the following alternative means will be considered in the Impact Assessment:

- Alternative locations for the Project site;
- Alternative layouts of the various facilities within the Project site;
- Alternative workforce accommodations;
- Other CANDU nuclear power technologies;
- Switchyard designs; and
- Radioactive waste management strategies.

4.6.1 Alternative Locations

Previous work conducted in 2009 (Golder, 2009) was used to inform the regional siting process to identify potential siting areas of interest that meet the minimum size requirements with a very high degree of environmental, social and technical suitability. From this work in 2009, two candidate sites were identified (Figure2.1-1 and Figure2.1-2).

- Option 1 sited on the west bank of the Peace River, approximately 30 km north of the Town of Peace River, in the County of Northern Lights; and
- Option 2 is sited on the east side of the Peace River, also approximately 30 km north of the Town of Peace River, in the Northern Sunrise County.

A siting evaluation is underway to validate that these two candidate sites are suitable for deploying up to four MONARK reactors including water storage pond(s) switch yard and ancillary infrastructure requiring approximately 640 ha of land to contain the footprint of the main plant. The goal of this siting evaluation is to select an appropriate location for the proposed nuclear installations, so that the site characteristics can effectively accommodate engineering protective measures against both natural and human-induced hazards from external events. This approach provides a high margin of insurance that a sufficient level of safety can be achieved.

The siting evaluation is still ongoing; therefore, Part C &D Location Information and Context will provide information on both site options being considered.

4.6.2 Alternative Site Layouts

The current preliminary site layout (Figure 4.4-7) demonstrates the minimal land area needed for the Project site. An alternative generic site layout with the “power block” (main power generation buildings) rotated 90º is shown in Figure 4.4-9. The actual site layout will be optimized once the land available and dedicated to the Project has been finalized. At that time, design of the site will consider key criteria for optimization of the layout and specific placement of the various plant facilities; such criteria include site-wide environmental and radiological safety, plant performance, proximity to required supporting infrastructure (e.g., the Peace River, roads, high-voltage corridor and local distribution station), and security and safeguarding.

4.6.3 Alternative Workforce Accommodations

Alternative accommodations for workers refer to different housing options provided for workers involved in the Project. These accommodations provide that workers have a safe and comfortable place to stay while working on the Project. The options may include:

- Temporary Housing: Portable units or trailers set up near the project site for workers to live in during the construction phase.
- Rental Properties: Renting houses or apartments in nearby towns or communities for workers.
- Hotels and Motels: Arranging for workers to stay in local hotels or motels.
- Worker Camps: Establishing dedicated camps with facilities such as dining halls, recreation areas, and medical services.

Alternatives for workforce accommodations will be a key discussion topic when engaging with Indigenous Nations and Communities, and local municipal and regional villages, towns, counties and municipal districts.

4.6.4 Alternative Technologies

The means of delivering the proposed maximum output of 4,800 MWe could alternatively be delivered via an alternate reactor design.

Like the MONARK reactor, the Enhanced CANDU 6 (EC6) reactor is also rooted in the successful CANDU 6 design deployed globally. The EC6 shares similar key safety and efficiency features found in prior CANDU technology and also offers many of the same improvements over the precursor CANDU 6 as the CANDU MONARK plant. The gross electrical power for an updated EC6 design would be greater than 750Mwe per unit using a modern improved turbine generator.

These six units would have an effective approximate combined land area requirement for the power block of approximately 13 ha. This makes its power density 340 MWe/ha. Note that some efficiencies through sharing of common systems is still possible in the final site detailed design. However, the increased power density is not expected to exceed 380 MWe/ha. Comparing this to the MONARK plant design, the combined land area requirements for the power block for four units is approximately 9.5 ha giving it a power density of 460 MWe/ha.

Similarly, the small modular reactor (SMR) design concepts that are currently being considered globally for other new build nuclear projects, would also provide the same benefits of nuclear power to the Project. However, their land requirement for the same gross electrical output is even greater than the CANDU EC6 plant (i.e., their power density is even less favourable). This is because SMRs are inherently designed to be a single-unit, self-contained plant, with little to no ability to share common services between multiple units on one site. This makes multiple unit land requirements even less optimal. To meet the same gross electrical output for this Project would require 15 SMR reactors. Based on publicly available data, this number of units would require a minimum of 15 ha for the power block. This puts the power density at the most 300 MWe/ha, potentially lower.

In addition to the greater area of land required for the same electrical power output, the current feasible options for an SMR are designed and largely manufactured by U.S. companies, based on U.S. intellectual property, and using almost entirely U.S. skilled workers and supply chain. Canadian content for currently available SMR plants will be only the minimum that these U.S. companies require to be able to sell to interested parties in Canada. This is compared to any of the CANDU reactors which are Canadian designed and made, with support to developing local in-province expertise and supply chain.

For these reasons, the CANDU MONARK design is preferred as the technology for this Project.

4.6.5 Alternative Switchyard Design

Project specific transmission infrastructure includes the substation and switchyard requirements to safely and reliably connect the Project to the provincial grid, together with newly built 500KV transmission lines extending the existing grid in a robust fashion to the powerplant. These two transmission components are integral to, and the minimum requirement to safely and reliably connect the new power plant to the provincial grid. Early transmission studies and connection configuration options are being undertaken to determine the preferred transmission connection alternatives. The final design, routing and approvals will follow the Alberta Utilities Commission and Alberta Transmission Regulation process for new high voltage transmission infrastructure development.

The current preliminary site layout (Figure 4.4-7) shows the current planned design of enclosed switchyards.

An alternative to an enclosed switchyard design is an open design. The open design is a simpler arrangement and can be simpler and cheaper to construct; however, there are many advantages of the enclosed design, including:

- **Increased Safety and Environmental Protection**: Enclosures provide additional protection against accidental contact and damage to the equipment from environmental hazards. It also protects the surrounding environment from any hazards generated by the equipment, including hazards to wildlife.
- **Reliability**: Enclosed equipment is less susceptible to weather conditions such as rain, snow, and dust, which can improve the reliability and longevity of the equipment.
- **Space Efficiency**: Indoor switchgear typically occupies less space compared to outdoor setups.
- **Lower Maintenance Costs**: Being protected from the elements, enclosed equipment requires less maintenance. Also, maintenance can be conducted easily and safely in a protected environment, leading to lower health and safety risk and shorter maintenance task times in inclement weather.
- **Enhanced Security**: Enclosures can provide an additional level of security against vandalism and unauthorized access.

4.6.6 Alternative Waste Management

The Project will include studies to assess the best available technique(s) for the treatment of both non-radioactive and radioactive waste. It is expected that those techniques will include the normal municipal disposal of non-radioactive wastes for the site, as well as an industrial facility.

The types of waste that will be produced will be divided into a number of waste categories which are suitable for compaction, incinerable or non-processible wastes. The largest volume of waste on the operating site will be non-radioactive and low-level radioactive waste generated during normal operations. Waste types and their quantities are discussed in Section 7.9.

The chosen waste management strategy is based on the application of the waste hierarchy and using a waste-led design approach.

- **Avoidance** – several means are used in the design to prevent the generation of activation products which include the choice of materials that can withstand high temperatures, radiation, and corrosive environments. The design also allows the avoidance of multiple handling of nuclear wastes which would generate further contaminated materials.
- **Minimization** – various minimization methods will be incorporated into the design and waste processing facilities for the plant, including reducing the quantity of non-radioactive wastes through standard waste reduction practices, decontamination where possible to reduce the classification of wastes as active, and core principles such as concentrate, contain, sort, and segregate different waste types to minimize the volume of active wastes (in general) and higher active wastes (within radioactive waste streams). This also includes the minimization and management of secondary nuclear waste generation by the segregation of other wastes, exempt, and out of scope wastes.

- **Recycling** – a comprehensive recycling program for materials which can be segregated and recycled such as metals, plastics and electrical components.
- **Reuse** – for example, through the reuse/refurbishment of components rather than their disposal or further generation of electricity from the heat generated from incineration of combustible materials.
- **Disposal** – This is the least preferred option and will only be considered when there are no alternatives.

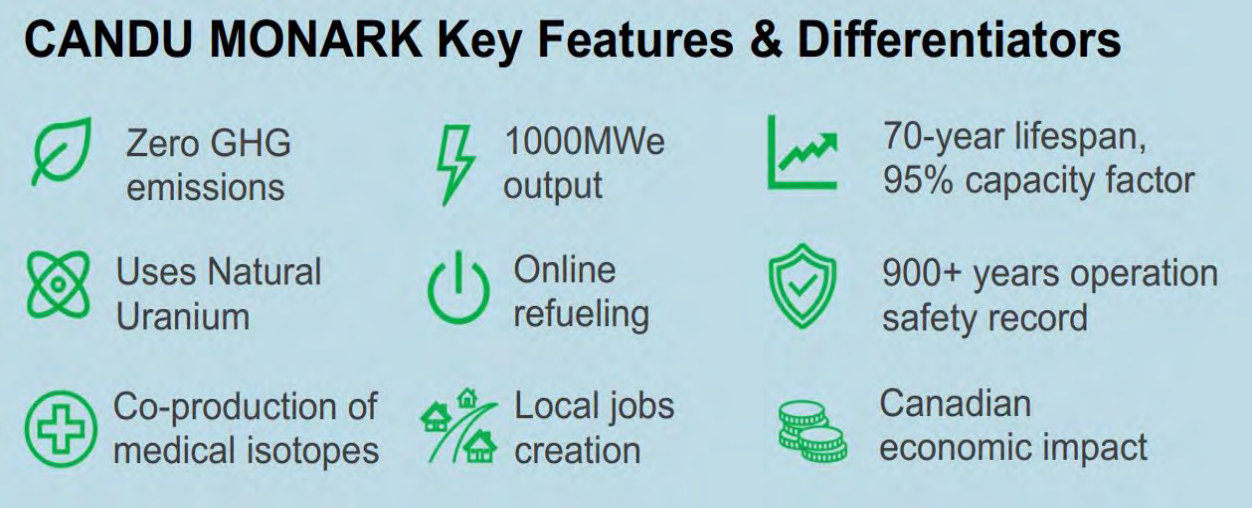
Alternatives considered for non-radioactive waste processing and disposal include the packaging and safely disposing of wastes into municipal waste disposal facilities (where appropriate) or through specialized conventional waste processing facilities (where required). Although this is expected for most non-radioactive wastes, some conventional wastes may be processed on the site if considered best available technique.

The alternative to the chosen means of radioactive waste processing and interim storage on the site, would be to package and ship off-site all radioactive wastes or a certain portion of the radioactive waste streams (e.g., low-level radioactive wastes). Since Alberta does not currently operate any dedicated nuclear waste management (i.e., processing and storage) facilities and shipping wastes to Ontario where such facilities exist is considered to introduce undue risk and cost to the Project, this alternative was not chosen.

4.7 Potential Alternatives to the Project

Alberta's economic and energy future requires a diverse electricity grid that can meet high demand periods (GOA 2024a). The CANDU MONARK reactor stands out as a premier choice for modern nuclear energy solutions, offering a blend of high reliability, compact design, and environmental sustainability. With an impressive annual capacity factor exceeding 95%, the CANDU MONARK provides a reliable and consistent electricity supply, minimizing downtime and maximizing output. Its small footprint makes it an ideal option to increase energy density, allowing for efficient land use without compromising on power generation capabilities.

Furthermore, the CANDU MONARK produces stable electricity, providing a dependable energy source that can support both residential and industrial needs. Most notably, this reactor operates with zero GHG emissions during electricity generation, contributing to the reduction of carbon footprints and supporting global efforts towards achieving net-zero emissions.



To meet Alberta's growing energy needs while reducing GHG emissions, solar and wind energy are two notable alternatives. These non-emitting sources of electricity are integral to Alberta's plans to decarbonize the grid. However, when considering reliable, long-term baseload generation to meet the forecasted electricity demand, large nuclear power remains the best and most proven option.

4.7.1 Solar Power

Footprint: Solar power requires much larger footprint. A solar farm that generates 1 MW electricity requires approximately 5 – 10 acres of land, which is means that solar power needs approximately 22,000 acres – 44,000 acres (8,900 ha – 17,800 ha) of land required to generate 4,400 MW. This is as opposed to approximately 640 ha for the same 4,400 MW capacity of a 4-unit CANDU MONARK with cooling ponds and cooling towers (actual land area depends on final site-specific layout but is within this order of magnitude). Extensive use of land for a solar farm causes disruptions to the hosting communities such as discussed in the next point.

Land Use and Aesthetics: Solar farms require large areas of land, which can lead to the displacement of agricultural activities or natural habitats. This can be particularly concerning in rural areas where land is a valuable resource. Additionally, the visual impact of vast arrays of solar panels can be considered unsightly by some community members.

Environmental Impact: The construction and maintenance of solar farms can disrupt local ecosystems. This includes the potential for soil erosion, habitat loss for wildlife, and the use of water resources for cleaning the panels. Moreover, the production and disposal of solar panels involve hazardous materials, which can pose environmental and health risks if not managed properly.

Intermittent Energy Supply: Solar energy is dependent on sunlight, which means it is not available at night and can be less reliable during cloudy or rainy days. This intermittency can pose challenges for maintaining a stable energy supply and may require additional infrastructure for energy storage or backup power sources. In Alberta, the average capacity factor of a solar farm is less than 20 per cent. Considering the conditions in the Peace River region, such as available sunlight during the winter months, snow, and cloudy days, the capacity factor can further drop, increasing risks of blackouts due to unreliable power supply. CANDU MONARK's annual capacity factor is 95%, and such figures are not impacted by the local conditions.

Economic Concerns: While solar farms can create jobs during the construction phase, the long-term employment opportunities are relatively limited. Additionally, the initial investment and maintenance costs can be high, which might not be feasible for all communities.

Lifecycle Reliability: Solar panels lifespan is less than 40 years, and the performance of the system will naturally degrade over time with degradation of its components, while CANDU MONARK has a lifespan of 70 years of consistent power output.

4.7.2 Wind Power

Footprint: Wind power also requires a large footprint A wind farm that generates 1 MW electricity requires approximately 2 – 40 acres of land depending on variety of factors, which is equivalent to approximately 8,800 acres - 176,000 acres (3,560 ha – 71,250 ha) of land required to generate 4,400 MW. This is as opposed to approximately 640 ha for the same 4,400 MW 4-unit CANDU MONARK with cooling ponds and cooling towers (actual land area depends on final site-specific layout but is within this order of magnitude). Wind farms on flat land areas will require more land due to lower wind speeds and they will require further spacing between the wind turbines. This extensive footprint causes disruptions to the hosting communities such as discussed in the next point.

Land Use: Wind farms require large areas of land, which can lead to the displacement of agricultural activities or natural habitats. This can be particularly concerning in rural areas where land is a valuable resource.

Wildlife Impact: The presence of wind turbines can pose risks to local wildlife, particularly birds and bats, which may collide with the turbine blades. This can lead to a decline in local wildlife populations.

Visual Impact and Noise: Wind turbines can be considered unsightly by some community members, especially in scenic or rural areas. Additionally, the noise generated by the turbines can be a source of disturbance for nearby residents.

Intermittent Energy Supply: Wind energy is dependent on wind conditions, which means it is not always available. This intermittency can pose challenges for maintaining a stable energy supply and may require additional infrastructure for energy storage or backup power sources. In Alberta, the average capacity factor of a wind farm is around 30-40%. CANDU MONARK's annual capacity factor is 95%, and such figures are not impacted by the local wind conditions.

Economic Concerns: While wind farms can create jobs during the construction phase, the long-term employment opportunities are relatively limited. Additionally, the initial investment and maintenance costs can be high, which might not be feasible for all communities.

Lifecycle Reliability: Wind farm lifespan is less than 25-30 years, with continual degradation of the system components leading to decreasing performance and catastrophic failure of considerable size components far above the ground, causing risk to nearby wildlife and people. The ongoing effective inspection and maintenance of such infrastructure during extreme weather conditions can be challenging. The CANDU MONARK has a lifespan of 70 years of consistent power output.

5 PART C & D – LOCATION INFORMATION AND CONTEXT

5.1 Proposed Location of the Project

5.1.1 Geographical Location

There are two possible options being considered for the Project site. Option 1 is sited on the west bank of the Peace River, approximately 30 km north of the Town of Peace River, in the County of Northern Lights (Figure2.1-1). The approximate centre of the Option 1 Project site is located at coordinates:

- Universal Transverse Mercator (UTM) (NAD Zone 11V) 486153.4793E 6259545.727N; and
- Latitude/longitude 56°28'48.6050"N,117°13'29.3137"W.

Option 2 is sited on the east side of the Peace River, also approximately 30 km north of the Town of Peace River, in the Northern Sunrise County (Figure2.1-2). The approximate centre of the Option 2 Project site is located at coordinates:

- UTM (NAD Zone 11V) 493197.3452E 6251806.1099N; and
- Latitude/longitude 56°24'38.8351"N, 117°06'36.8835"W.

The Project site during the operations phase will cover 6.4 squared kilometers (km2) in area or approximately 640 ha. This is the minimum area required for the site. This area would be fenced and contain the reactors and all the supporting plant facilities required during operations, as well as encompassing the exclusion area boundary . The Project site is situated in a predominantly agricultural area and does not contain any major water bodies. The site is generally flat and has historically been used for agricultural purposes. The site is located on a plateau, approximately 210 m above the Peace River.

With regards to the proposed location options and provincial and local response organization EPZs, as noted in Section 4.4.2.3.4, the definition and size of the required EPZs is unknown at this time and will be developed as part of the design and licensing activities for the Project. However, noting definitions and sizes for the existing Canadian nuclear power generating stations zones, neither location option would require any interprovincial emergency planning coordination.

Early transmission studies and connection configuration options are being undertaken to determine the preferred transmission connection alternatives. The final design, routing and approvals will follow the Alberta Utilities Commission and Alberta Transmission Regulation process for new high voltage transmission infrastructure development.

5.1.2 Site Maps

Mapping provided in this IPD includes:

- Project Location (Figure1-1);
- Site Context – Project Site (Figure2.1-1 and Figure2.1-2);
- Conceptual Site Layout (Figure 4.4-6);
- Location of Local Communities(Figure 5.1-1);
- Watershed, Watercourses and Waterbodies (Figure 5.1-2);
- Nearby Seasonal-use Properties (Figure 5.1-3); and
- First Nation Reserves and Métis Settlements associated with the preliminary list of Potentially Impacted Indigenous Nations and Communities (Figure 5.1-4)

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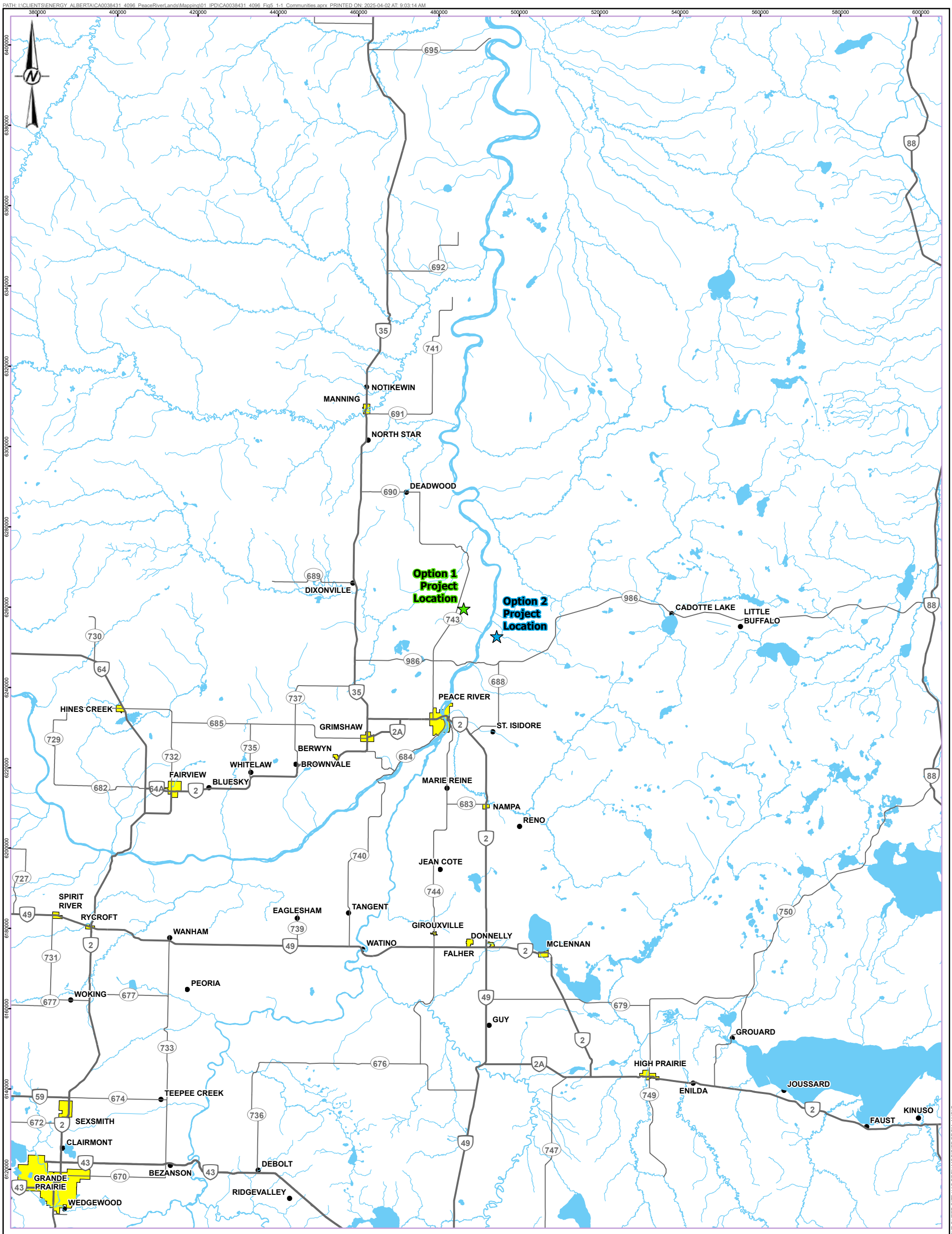

LEGEND

- HAMLET
- OPTION 1 PROJECT LOCATION
- OPTION 2 PROJECT LOCATION
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- POPULATED PLACE
- WATERBODY

0 20 40

1:900,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
LOCATION OF LOCAL COMMUNITIES

CONSULTANT

YYYY-MM-DD	2025-04-02
DESIGNED	MJ
PREPARED	KW
REVIEWED	CB
APPROVED	MM

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6280000 6260000 6240000 6220000

PEACE RIVER AND BUCHANAN CREEK WATERSHED

LITTLE CADOTTE RIVER WATERSHED

CADOTTE RIVER WATERSHED

WHITEMUD RIVER WATERSHED

PEACE RIVER AND CARMON CREEK WATERSHED

PEACE RIVER ABOVE SMOKY RIVER WATERSHED

LOWER SMOKY RIVER WATERSHED

NORTH HEART RIVER WATERSHED

Peace River
Little Cadotte River
Cadotte River
Whitemud River
Rousseau Creek
Driftwood Lake
Carmon Creek
Lake St. Germain
Leddy Lake
Carmon Lake
Strong Creek
Pats Creek
Heart River
North Heart River

ST. ISIDORE

PEACE RIVER

743 744 986 688 2 2A 684

LEGEND

- HAMLET
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- POPULATED PLACE
- WATERBODY

WATERSHED

- CADOTTE RIVER
- LITTLE CADOTTE RIVER
- LOWER SMOKY RIVER
- NORTH HEART RIVER
- PEACE RIVER ABOVE SMOKY RIVER
- PEACE RIVER AND BUCHANAN CREEK
- PEACE RIVER AND CARMON CREEK
- WHITEMUD RIVER

0 5 10

1:200,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
WATERSHED, WATERCOURSES AND WATERBODIES

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MJ
PREPARED	KW
REVIEWED	CB
APPROVED	MM

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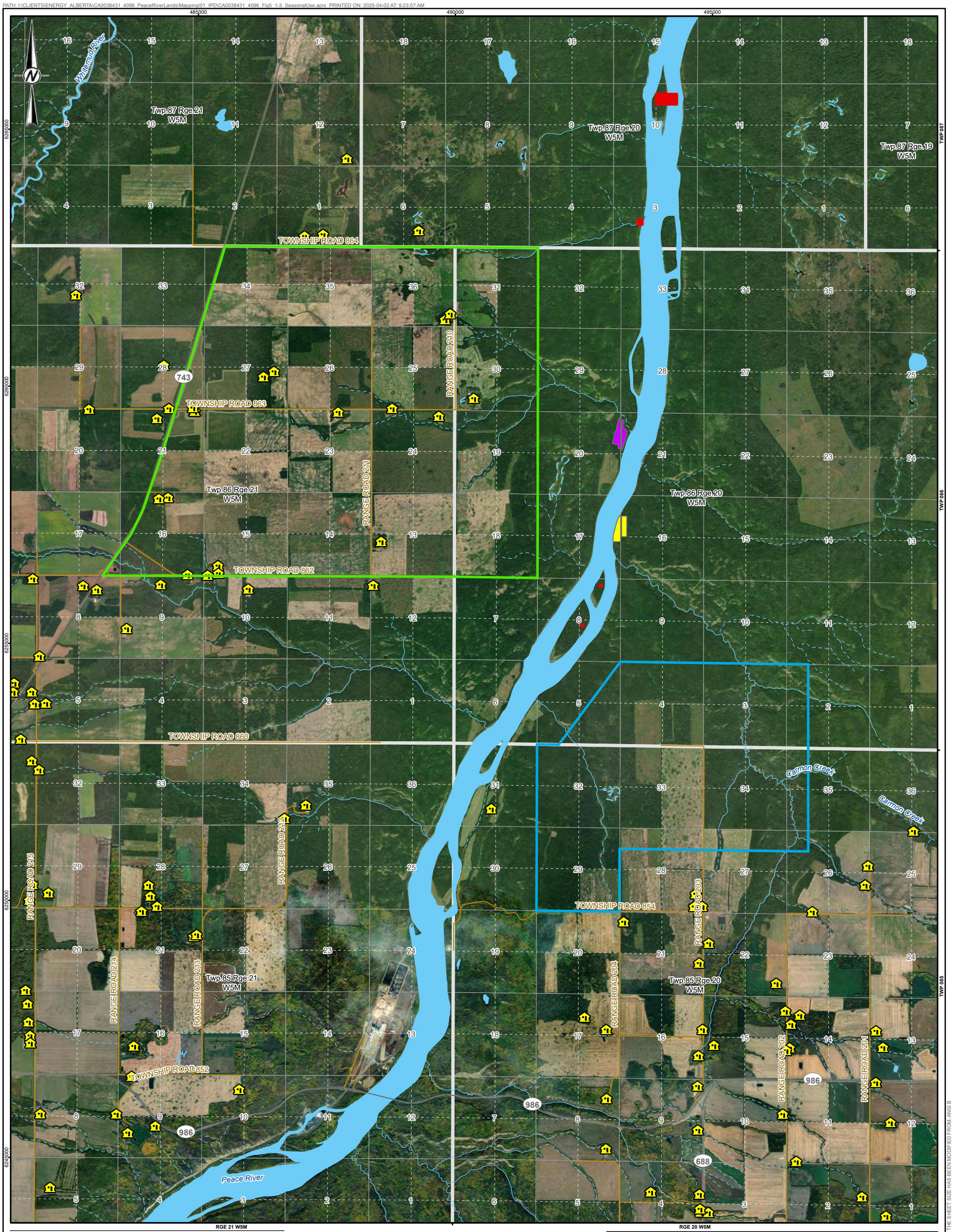

LEGEND

- POTENTIAL PERMANENT RESIDENCE
- SECONDARY HIGHWAY
- LOCAL ROAD
- WATERCOURSE
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- WATERBODY

RECREATION DISPOSITONS

- WEBERVILLE COMMUNITY FOREST ASSOCIATION MODEL FOREST
- PEACE RIVER BOATING ASSOCIATION CAMPSITE AND PICNIC AREA
- RECREATIONAL COTTAGE

0 1.5 3

1:70,000 KILOMETRES

REFERENCE(S)

1. RESIDENCES DERIVED FROM THE ALBERTA BIODIVERSITY MONITORING INSTITUTE 2021 HUMAN FOOTPRINT.
2. BASE DATA MAY BE OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED, ALTALIS LTD. © GOVERNMENT OF ALBERTA 2024. ALL RIGHTS RESERVED, OR S&P GLOBAL INC. IMAGERY COPYRIGHT © 20210920 ESRI AND ITS LICENSORS. SOURCE: EARTHSTAR GEOGRAPHICS. USED UNDER LICENSE, ALL RIGHTS RESERVED.
3. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

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ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
NEARBY SEASONAL-USE PROPERTIES

CONSULTANT

wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MS
PREPARED	KW
REVIEWED	CB
APPROVED	MM

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FIGURE
5.1-3

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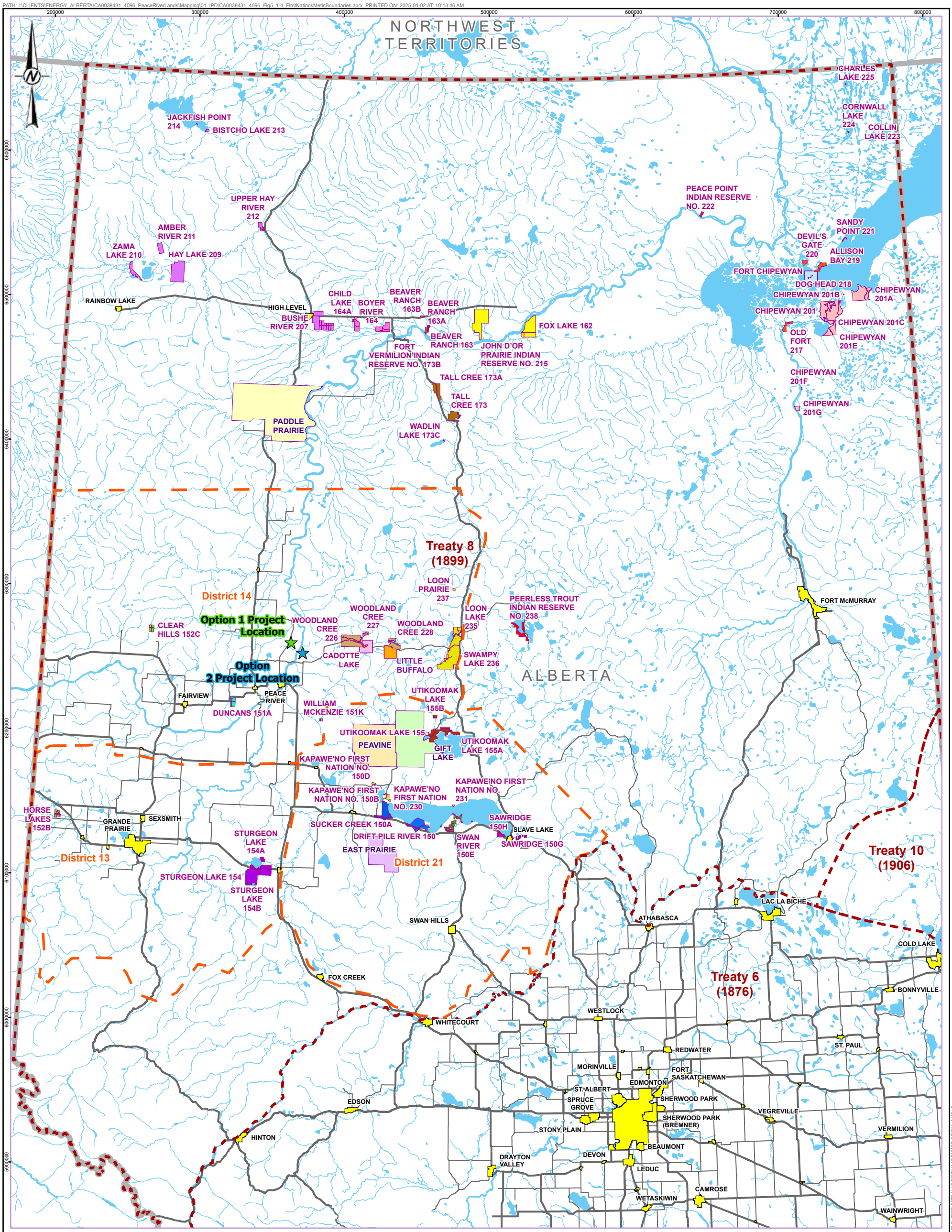

LEGEND

- OPTION 1 PROJECT LOCATION
- OPTION 2 PROJECT LOCATION
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- POPULATED PLACE
- TREATY BOUNDARY
- WATERBODY

INDIGENOUS RESERVE

- ATHABASCA CHIPEWYAN FIRST NATION
- BEAVER FIRST NATION
- DENE THA' FIRST NATION
- DRIFTPILE CREE NATION
- DUNCAN'S FIRST NATION
- HORSE LAKE FIRST NATION
- KAPAWE'NO FIRST NATION
- LITTLE RED RIVER CREE
- LOON RIVER FIRST NATION
- LUBICON LAKE BAND
- MIKISEW CREE FIRST NATION
- PEERLESS TROUT FIRST NATION
- SAWRIDGE FIRST NATION
- STURGEON LAKE CREE NATION
- SUCKER CREEK FIRST NATION
- SWAN RIVER FIRST NATION
- TALLCREE TRIBAL GOVERNMENT
- WHITEFISH LAKE FIRST NATION
- WOODLAND CREE FIRST NATION

MÉTIS SETTLEMENT

- CADOTTE LAKE MÉTIS
- EAST PRAIRIE MÉTIS
- FORT CHIPEWYAN MÉTIS
- GIFT LAKE MÉTIS
- OTIPEMISIWAK MÉTIS GOVERNMENT
- PADDLE PRAIRIE MÉTIS
- PEAVINE MÉTIS

0 50 100
1:2,500,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 10TM AEP FOREST
2. OTIPEMISIWAK MÉTIS GOVERNMENT CONSISTS OF DISTRICTS 14, 21 & 13 (MÉTIS NATION OF ALBERTA). BOUNDARIES ARE APPROXIMATE.

REFERENCE(S)

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
FIRST NATION RESERVES AND MÉTIS SETTLEMENTS ASSOCIATED WITH THE PRELIMINARY LIST OF POTENTIALLY IMPACTED INDIGENOUS NATIONS AND COMMUNITIES

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	LH
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO.	CONTROL	REV.	FIGURE
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5.1.3 Legal Description of Land

The Project site is not located on federal Crown lands. Access to the Peace River for water intake infrastructure may interact with provincial Crown lands. The legal description for the Project site options is presented in Table 5.1-1. This does not include water intake infrastructure currently as more detailed local investigations will be required to identify suitable locations and access to the Peace River.

Table 5.1-1: Legal Descriptions for the Project Site

Meridian	Range	Township	Section	Quarter Section	Description
Option 1					
5	21	86	14	NE	NE-14-86-21-5
5	21	86	14	SE	SE-14-86-21-5
5	21	86	14	SW	SW-14-86-21-5
5	21	86	14	NW	NW-14-86-21-5
5	21	86	15	NE	NE-15-86-21-5
5	21	86	15	SE	SE-15-86-21-5
5	21	86	15	SW	SW-15-86-21-5
5	21	86	21	SE	SE-21-86-21-5
5	21	86	21	SW	SW-21-86-21-5
5	21	86	22	NE	NE-22-86-21-5
5	21	86	22	SE	SE-22-86-21-5
5	21	86	22	SW	SW-22-86-21-5
5	21	86	23	NE	NE-23-86-21-5
5	21	86	23	SE	SE-23-86-21-5
5	21	86	23	SW	SW-23-86-21-5
5	21	86	23	NW	NW-23-86-21-5
5	21	86	14	SW	SW-14-86-21-5
5	21	86	15	NE	NE-15-86-21-5
5	21	86	15	SE	SE-15-86-21-5
Option 2					
5	20	85	29	NE	5-20-85-29-NE
5	20	85	29	SE	5-20-85-29-SE
5	20	85	29	SW	5-20-85-29-SW
5	20	85	29	NW	5-20-85-29-NW
5	20	85	32	NE	5-20-85-32-NE
5	20	85	32	SE	5-20-85-32-SE
5	20	85	32	SW	5-20-85-32-SW

Table 5.1-1: Legal Descriptions for the Project Site

Meridian	Range	Township	Section	Quarter Section	Description
5	20	85	32	NW	5-20-85-32-NW
5	20	85	33	NE	5-20-85-33-NE
5	20	85	33	SE	5-20-85-33-SE
5	20	85	33	SW	5-20-85-33-SW
5	20	85	33	NW	5-20-85-33-NW

Note: The Alberta Township Survey system (ATS) is a grid dividing the province into equal-sized squares. The ATS designates land as being west of the 4th Meridian, 5th Meridian or 6th Meridian, and between these meridians are a series of columns called ranges and rows called townships both six miles wide. The term township also describes the six-mile by six-mile square formed when the range and township lines intersect. These townships are further divided into 36 sections, each measuring one-mile by one-mile. A section can be further divided into quarters (NE, NW, SE, SW). Legal descriptions are written as in the follow example: NE-14-86-21-5 – northeast quarter of section 14, township 86, range 21, west of the 5th Meridian.

5.1.4 Proximity to Residences and Communities

5.1.4.1 Option 1

The closest community to the Project is the Town of Peace River, approximately 28 km southwest by road of the Project (21 km directly). The nearest First Nation Reserve is Duncan's 151A, approximately 70 km southwest by road (51 km directly) from the Project.

The next closest First Nation Reserves are Woodland Cree 226 (74 km east of the Project by road [31 km directly]), William McKenzie 151K (78 km southeast by road [52 km directly]), and Woodland Cree 277 (85 km northeast of the Project by road [46 km directly]). Duncan's First Nation and Woodland Cree First Nation are signatories to Treaty 8 (Woodland Cree First Nation 2015). Peavine Métis Settlement is the nearest Métis settlement (175 km southeast of the Project by road [67 km directly]). The next closest Métis settlement is Gift Lake Métis Settlement (210 km southeast of the Project by road [82 km directly]).

The proximity to potential residences and communities are presented in Table 5.1-2 and Table 5.1-3.

Table 5.1-2: Potential Permanent Residences to Option 1

Type	Approximate Distance (m)	Direction From the Project Site
Potential Permanent Residence	29	S
Potential Permanent Residence	73	S
Potential Permanent Residence	103	E
Potential Permanent Residence	109	N
Potential Permanent Residence	123	N
Potential Permanent Residence	245	SE
Potential Permanent Residence	294	E

Table 5.1-2: Potential Permanent Residences to Option 1

Type	Approximate Distance (m)	Direction From the Project Site
Potential Permanent Residence	294	W
Potential Permanent Residence	318	SW
Potential Permanent Residence	325	S
Potential Permanent Residence	453	N
Potential Permanent Residence	474	W
Potential Permanent Residence	585	NW
Potential Permanent Residence	713	N
Potential Permanent Residence	754	N
Potential Permanent Residence	881	SW
Potential Permanent Residence	906	NE

Table 5.1-3: Nearest Communities to Option 1

Type	Name	Approximate Distance (km)	Approximate Distance by Road (km)	Direction From the Project Site
Town	Peace River	21	28	SW
Hamlet	Dixonville	27	53	NW
Hamlet	St. Isidore	28	46	SE
First Nation Reserve	Woodland Cree 226	31	74	E
Hamlet	Deadwood	32	45	NW
Town	Grimshaw	35	47	SW
Hamlet	Marie Reine	42	51	S
Village	Berwyn	45	59	SW
First Nation Reserve	Woodland Cree 227	46	85	NE
Village	Nampa	46	59	S
Hamlet	Cadotte Lake	48	82	E
Hamlet	North Star	48	70	NW
First Nation Reserve	Duncans 151A	51	70	SW
First Nation Reserve	William Mckenzie 151K	52	78	SE
Town	Manning	53	77	NW
Hamlet	Brownvale	53	69	SW
Hamlet	Reno	53	73	SE
Hamlet	Notikewin	60	83	NW
Hamlet	Jean Cote	62	75	S
First Nation Reserve	Woodland Cree 228	63	107	E
Hamlet	Whitelaw	64	84	SW

Table 5.1-3: Nearest Communities to Option 1

Type	Name	Approximate Distance (km)	Approximate Distance by Road (km)	Direction From the Project Site
Hamlet	Little Buffalo	65	100	SE
Métis Settlement	Peavine Métis Settlement	67	175	SE
Hamlet	Bluesky	74	96	SW
Town	Falher	77	96	S
Village	Girouxville	78	89	SW
Hamlet	Tangent	78	95	SW
Town	Fairview	79	105	SW
Village	Donnelly	81	96	S
Métis Settlement	Gift Lake Métis Settlement	82	210	SE
Hamlet	Eaglesham	84	135	SW
Hamlet	Watino	84	112	SW
Town	Mclennan	85	108	SE
Village	Hines Creek	85	110	SW
First Nation Reserve	Clear Hills 152C	93	148	West
First Nation Reserve	Swampy Lake 236	98	151	SE

5.1.4.2 Option 2

The closest community to the Project is the town of St. Isidore, approximately 23 km south by road of the Project (19 km directly).

The nearest First Nation Reserve is Woodland Cree 226, approximately 49 km northeast from the Project by road (27 km directly). Woodland Cree First Nation and Duncan's First Nation are signatories to Treaty 8 (WCFN 2015). The next closest First Nation Reserves are Woodland Cree 227 (59 km northeast of the Project by road [43 km directly]), Duncan's 151A (78 km southwest of the Project by road [51 km directly]), and Woodland Cree 228 (82 km northeast of the Project by road [59 km directly]). Peavine Métis Settlement is the nearest Métis settlement (160 km southeast of the Project by road [57 km directly]). The next closest Métis settlement is Gift Lake Métis Settlement (195 km southeast of the Project by road [73 km directly]).

The proximity to potential residences are presented in Table 5.1-4 and communities in Table 5.1-5.

Table 5.1-4: Potential Permanent Residences to Option 2

Type	Approximate Distance (m)	Direction From the Project Site
Potential Permanent Residence	294	SE
Potential Permanent Residence	953	W

Table 5.1-5: Nearest Communities to Option 2

Type	Name	Approximate Distance (km)	Approximate Distance by Road (km)	Direction From the Project Site
Town	Peace River	15	39	SW
Hamlet	St. Isidore	19	23	S
First Nation Reserve	Woodland Cree 226	27	49	NE
Town	Grimshaw	34	56	SW
Hamlet	Marie Reine	35	56	SW
Hamlet	Dixonville	37	61	NW
Village	Nampa	37	44	S
Hamlet	Deadwood	42	80	NW
First Nation Reserve	William Mckenzie 151K	42	60	SE
First Nation Reserve	Woodland Cree 227	43	59	NE
Hamlet	Reno	43	58	SE
Village	Berwyn	44	68	SW
Hamlet	Cadotte Lake	44	57	NE
First Nation Reserve	Duncans 151A	51	78	SW
Hamlet	Brownvale	54	81	SW
Hamlet	Jean Cote	55	70	SW
Métis Settlement	Peavine Métis Settlement	57	160	SE
Hamlet	North Star	58	97	NW
First Nation Reserve	Woodland Cree 228	59	82	NE
Hamlet	Little Buffalo	61	74	NE
Town	Manning	63	105	NW
Hamlet	Whitelaw	65	96	SW
Hamlet	Notikewin	70	111	NW
Village	Girouxville	70	88	SW
Town	Falher	71	81	SW
Village	Donnelly	72	81	S
Hamlet	Tangent	73	103	SW
Métis Settlement	Gift Lake Métis Settlement	73	195	SE
Town	Mclennan	75	93	SE
Hamlet	Bluesky	76	108	SW
Hamlet	Watino	79	111	SW
Hamlet	Eaglesham	81	134	SW
Town	Fairview	82	117	SW
Village	Hines Creek	91	118	SW
Hamlet	Guy	92	98	S

Table 5.1-5: Nearest Communities to Option 2

Type	Name	Approximate Distance (km)	Approximate Distance by Road (km)	Direction From the Project Site
First Nation Reserve	Swampy Lake 236	93	126	E
First Nation Reserve	Utikoomak Lake 155B	98	192	SE
First Nation Reserve	Kapawe'no First Nation No. 150D	98	145	SE

5.1.5 Proximity to Land Used for Traditional Purposes by Indigenous Peoples of Canada

Both Option 1 and Option 2 sites are situated within an area covered under Treaty 8, signed in 1899. Based on current knowledge, including documentation publicly available (GOC 2024a), the proponent understands that the Project is located on lands that may have been used previously for traditional purposes. A preliminary list of Indigenous Nations and Communities that may have traditional land use history or interest in the Project are identified in Section 3.2.2. Details related to First Nation Reserves and Métis Settlements associated with the preliminary list of Indigenous Nations and Communities are presented in Table 5.1-6.

Table 5.1-6: First Nation Reserves and Métis Settlements associated with the preliminary list of Potentially Impacted Indigenous Nations and Communities

Indigenous Nations and Communities (in alphabetical order)	Reserves or Settlements	On-Own Reserve Population (2025)	Off-Reserve Population (2025)	Total Population[(a)]
Athabasca Chipewyan First Nation	Chipewyan Indian Reserve 201	35	1,265	1,533
	Chipewyan Indian Reserve 201A			
	Chipewyan Indian Reserve 201B			
	Chipewyan Indian Reserve 201C			
	Chipewyan Indian Reserve 201D			
	Chipewyan Indian Reserve 201E			
	Chipewyan Indian Reserve 201F			
	Chipewyan Indian Reserve 201G			
Beaver First Nation	Boyer 164	456	898	1,389
	Child Lake 164A			
Cadotte Lake Métis	Cadotte Lake Métis	n/a	n/a	n/a

Table 5.1-6: First Nation Reserves and Métis Settlements associated with the preliminary list of Potentially Impacted Indigenous Nations and Communities

Indigenous Nations and Communities (in alphabetical order)	Reserves or Settlements	On-Own Reserve Population (2025)	Off-Reserve Population (2025)	Total Population[(a)]
Dene Tha' First Nation	Amber River 211	2,109	1,129	3,302
	Bistcho Lake 213			
	Bushe River 207			
	Hay Lake 209			
	Jackfish Point 214			
	Upper Hay River 212			
	Zama Lake 210			
Driftpile Cree Nation	Drift Pile River 150	988	2,192	3,228
Duncan First Nation	Duncan's IR 151A	141	259	402
	William McKenzie IR 151K			
East Prairie Métis	East Prairie Métis Settlement	n/a	n/a	310
Fort Chipewyan Métis	Fort Chipewyan Métis	n/a	n/a	n/a
Gift Lake Métis	Gift Lake Part A Métis Settlement	n/a	n/a	625
	Gift Lake Part B Métis Settlement	n/a	n/a	n/a
Horse Lake First Nation	Clear Hills IR 152C	517	901	1,432
	Horse Lake IR 152B			
Kapawe'no First Nation	Kapawe'no First Nation 150B	138	343	491
	Kapawe'no First Nation 150C			
	Kapawe'no First Nation 150D			
	Kapawe'no First Nation 229			
	Kapawe'no First Nation 230			
	Kapawe'no First Nation 231			
Little Red River Cree Nation	Fox Lake 162	5,255	755	6,699
	Garden Creek Indian Settlement			
	John D'or Prairie 215			
Loon River First Nation	Loon Lake 235	588	131	747
	Loon Prairie 237			
	Swampy Lake 236			
Lubicon Lake Band	Little Buffalo Indian Settlement	126	386	839

Table 5.1-6: First Nation Reserves and Métis Settlements associated with the preliminary list of Potentially Impacted Indigenous Nations and Communities

Indigenous Nations and Communities (in alphabetical order)	Reserves or Settlements	On-Own Reserve Population (2025)	Off-Reserve Population (2025)	Total Population[(a)]
Mikisew Cree First Nation	Allison Bay 219	177	2,502	3,281
	Charles Lake 225			
	Collin Lake 223			
	Cornwall Lake 224			
	Devil's Gate 220			
	Dog Head 218			
	Old Fort 217			
	Peace Point 222			
	Sandy Point 221			
Otipemisiwak Métis Government	Otipemisiwak Métis Government	n/a	n/a	n/a
Paddle Prairie Métis	Paddle Prairie Métis Settlement	n/a	n/a	551
Peavine Métis	Peavine Métis Settlement	n/a	n/a	387
Peerless Trout First Nation	Peerless Trout 238	65	151	1,113
Sawridge First Nation	Sawridge 150G	46	651	706
	Sawridge 150H			
Sturgeon Lake Cree Nation	Sturgeon Lake 154	1,543	2,307	3,894
	Sturgeon Lake 154A			
	Sturgeon Lake 154B			
Sucker Creek First Nation	Sucker Creek 150A	782	2,508	3,326
Swan River First Nation	Assineau River 150F	448	1,272	1,745
	Swan River 150E			
Tall Cree Tribal Government	Beaver Ranch 163	567	926	1,556
	Beaver Ranch 163A			
	Beaver Ranch 163B			
	Fort Vermilion 173B			
	Tall Cree 173			
	Tall Cree 173A			
	Wadlin Lake 173C			

Table 5.1-6: First Nation Reserves and Métis Settlements associated with the preliminary list of Potentially Impacted Indigenous Nations and Communities

Indigenous Nations and Communities (in alphabetical order)	Reserves or Settlements	On-Own Reserve Population (2025)	Off-Reserve Population (2025)	Total Population[(a)]
Whitefish Lake First Nation	Ukitoomak Lake 155	1,416	1,465	3,221
	Ukitoomak Lake 155A			
	Ukitoomake Lake 155B			
Woodland Cree First Nation	Cadotte Lake Indian Settlement	879	393	1,323
	Woodland Cree 226			
	Woodland Cree 227			
	Woodland Cree 228			

Note:
CIRNAC 2023 Population numbers for First Nations are for registered members in 2024 (GOC 2011). Population numbers for Métis settlements are from 2021 Statistics Canada census.

a) Use with caution. Includes registered population on own reserve, on other reserves, on own Crown land, on other Band Crown land, on No Band Crown land, and off-reserve.

5.1.6 Proximity to Federal Lands

As noted in Section 5.1.4 above, there are First Nations reserves located within 100 km of the Project sites. Energy Alberta is dedicated to fostering enduring, respectful relationships with Indigenous Nations and Communities in Canada that contribute to enabling Indigenous self-determination, sustainable development and lasting economic opportunities.

5.2 Physical and Biological Environment Overview

The following overview of the existing conditions for Option 1 and Option 2 sites are based primarily on existing information sources. The information is sufficient to provide a general description of each potential site, including key and sensitive environmental conditions that may be relevant to the Project. A more detailed description of the existing environment, including specific field investigations and studies, will be carried out as part of the Impact Assessment conducted for the Project.

5.2.1 Atmospheric Environment

5.2.1.1 Climate

Both site options are located within the moderate continental climatic zone characterized by short, moderately warm summers and long, cold winters. Meteorological information for the Peace River area is available from Environment Canada's weather office and is collected from their weather station located at the Peace River Airport (latitude of 56°13' N, longitude of 117°27' W, and elevation of 570.9 m). The recorded mean annual temperature for Peace River Airport is 1.2 degrees Celsius (°C). The coldest month is January, with a mean temperature of -16.0°C. The warmest month is July, with a mean temperature of 16.3°C (GOC 2024e).

Monthly precipitation values in the Peace River area range from 15.5 millimetres (mm) to 62.4 mm, with a total annual mean precipitation of 348.2 mm. The greatest amount of precipitation falls in June and July in the form of rain (GOC 2024e).

The prevailing winds blow from a southwesterly direction, with strong westerly and west-southwesterly components. Wind speeds are fairly consistent throughout the year. The mean wind speed, from 1955 to 2024, was 3.49 metres/second (m/s), with calms (<0.5 m/s) occurring less than 1% of the time. Wind speeds between 0.5 and 2.1 m/s occurred 25.0% of the time, and between 2.1 to 3.6 m/s about 25.2% of the time (GOC 2024e).

Visibility in the Peace River area is less than 1 km for less than 1% of the year, usually during the winter months. Most of the year (95% of the time), the visibility is greater than 9 km, with highest visibility in the months of May and July (GOC 2024e).

5.2.1.2 Air Quality

It is assumed that the local air quality is typical of a rural, agricultural area (Jacques Whitford Limited 2006). In the Peace River Valley, there are several emission sources, including oil production projects (i.e., Shell Canada Limited's Carmon Creek Project, and Husky Oil Operations Ltd.), the pulp and paper mill (Daishowa-Marubeni International Ltd.), and residential activity in the towns (i.e., Town of Peace River, Town of Grimshaw, Village of Berwyn).

Option 1 and Option 2 sites are both located in the Peace River Area Monitoring Program (PRAMP). The PRAMP area includes Peace County, and the southern parts of Northern Lights County and Northern Sunrise County. The closest continuous ambient air monitoring station is near Grimshaw, Alberta, which is approximately 40 km southwest of the Option 1 and Option 2 sites. The Grimshaw Station measures ambient concentrations of sulphur dioxide, total reduced sulphur, hydrocarbons, oxides of nitrogen, ozone, fine particulate matter, wind speed and direction, temperature, humidity, pressure, and calculated Air Quality Health Index.

The *2023 Annual Data Report* (PRAMP 2024) summarizes the regional air quality. In the summer of 2023, air quality was impacted by widespread wildfire smoke, where 687 exceedances of the 1-hour Alberta Ambient Air Quality Guideline (AAQG) and 71 exceedances of the 24-hour AAQG for fine particulate matter were detected. The Grimshaw Station recorded the highest particulate matter concentrations in Alberta due to the location of wildfires and the pattern of smoke dispersion. Other substances that peaked during wildfire events were methane and non-methane hydrocarbons, volatile organic compounds, and acrolein.

In 2023, sulphur dioxide and nitrogen dioxide ambient concentrations were below the Alberta Ambient Air Quality Objectives. Sulphur dioxide concentrations measured at the Grimshaw Station are among the lowest concentrations in Alberta and nitrogen dioxide concentrations are comparable to similar sized population centres as Grimshaw.

There were no odour complaints recorded within the PRAMP network in 2023.

An ambient radon monitoring program will be carried out as part of the detailed site investigation program. Radon detectors will be deployed at various locations chosen to represent the local conditions. The detail ambient radon monitoring program including monitoring approaches, monitoring locations, and results will be presented as part of the Impact Assessment.

5.2.1.3 Noise

The sources of noise in the Peace River Valley are mainly natural, such as wind or waves on the Peace River (Jacques Whitford Limited 2006). The Option 1 and Option 2 sites are in rural agricultural areas. Anthropogenic sources of noise include vehicle, boat and aircraft traffic, industry operations, and oil and gas production.

5.2.2 Geological and Hydrogeological Environment

With regards to this section, the regional study area (RSA) extends 5 km past the siting area of interest (i.e., Option 1 and Option 2). A stratigraphic log is available on Figure 5.2-1, which outlines the sequencing of the surficial and bedrock geology.

5.2.2.1 Surficial Geology

Within the RSA, it is expected that the surficial sediments overlying bedrock will consist of glacial moraine (till), glaciolacustrine deposits, colluvial deposits, eolian deposits, and organic deposits. The surficial geology is presented on Figure 5.2-2.

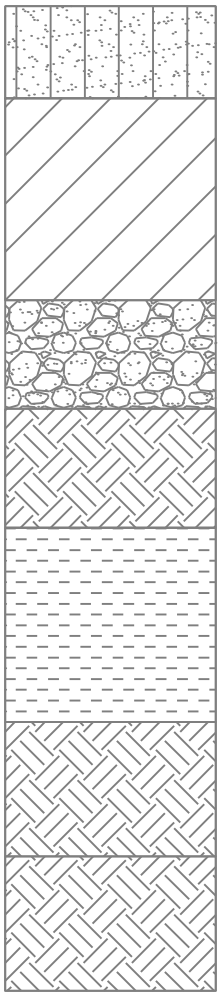
Southwest of Option 1 is the presence of pre-glacial Grimshaw gravels. These are isolated gravel deposits that are an important source of groundwater in the area. Based on information presented in Slomka et al. (2018) the deposits consist of three large lobes and four smaller ones that are located southwest of the RSA. Gravels from these deposits are not expected to be underlying either LSA (Slomka et al. 2018).

5.2.2.1.1 Option 1

Within the Option 1 site, the surficial sediments are expected to be dominantly glaciolacustrine deposit with glacial moraine (till) (Leslie and Fenton 2001). Based on mapping, surficial sediments are expected to be approximately 40 m thick on the western side of the site, increasing in thickness to the east (Atkinson et al. 2020).

5.2.2.1.2 Option 2

The sediments underlying Option 2 are anticipated to be similar to the Option 1 site sediments. The key difference is the thickness increases to 90 m or more (Atkinson et al. 2020). Closer to the Peace River, colluvial and/or eolian type deposits are expected as indicated on Figure 5.2-2.



SAND AND SILT

TILL

BASAL SAND AND GRAVEL
BURIED VALLEY GRAVELS

BEDROCK
DUNVEGAN FORMATION
(ERODED ON WEST BANK OF PEACE RIVER VALLEY)

SHALE
SHAFTESBURY FORMATION

BEDROCK
PEACE RIVER FORMATION

BEDROCK
SPIRIT RIVER FORMATION

NOT TO SCALE

CLIENT
ENERGY ALBERTA

PROJECT
PEACE REGION NUCLEAR PLANT PROJECT

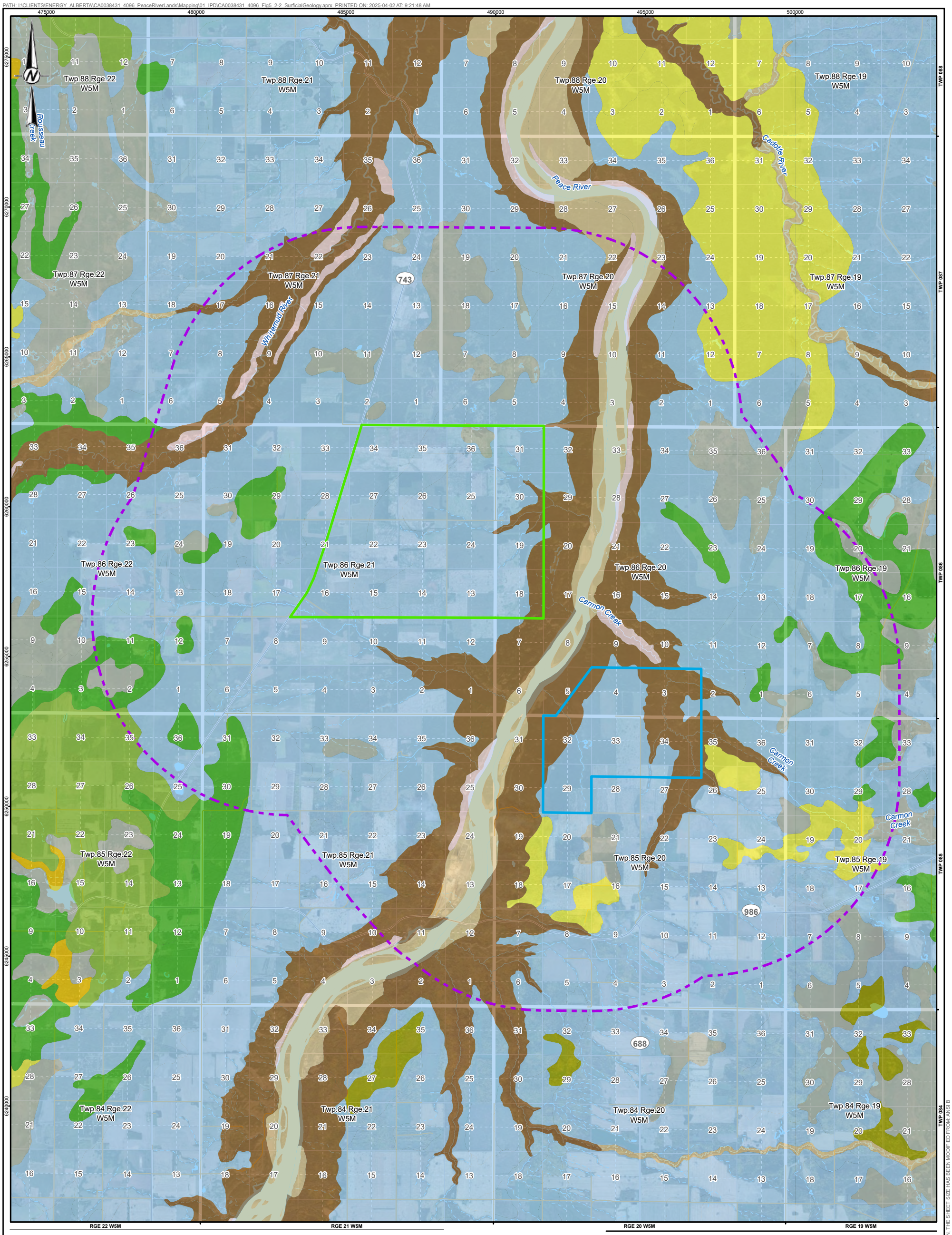
TITLE
STRATIGRAPHIC COLUMN - PEACE RIVER VALLEY

CONSULTANT

YYYY-MM-DD	2024-08-27
PREPARED	AH
DESIGN	JMC
REVIEW	NC
APPROVED	MM

PROJECT No.	CONTROL	Rev.	FIGURE
CA0038431.4096	300-HM-0001	0	5.2-1

PATH: I:\CLIENTS\ENERGY_ALBERTA\CA0038431_4096_PeaceRiverLands\Mapping\01_IPD\CA0038431_4096_Fig5_2-2_SurficialGeology.aprx PRINTED ON: 2025-04-02 AT: 9:21:48 AM



LEGEND

- WATERCOURSE
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- REGIONAL STUDY AREA
- WATERBODY

SURFICIAL GEOLOGY

- ORGANIC DEPOSITS (O)
- COLLUVIAL DEPOSITS (C)
- FLUVIAL DEPOSITS (F)
- EOLIAN DEPOSITS (E)
- GLACIOLACUSTRINE DEPOSITS (LG)
- GLACIOFLUVIAL DEPOSITS (FG)
- MORAINE (M)
- FLUTED MORAINE (MF)
- STAGNANT ICE MORAINE (MS)
- BEDROCK (R)

0 2 4

1:120,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

SURFICIAL GEOLOGY OBTAINED FROM ALBERTA GEOLOGICAL SURVEY.

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
SURFICIAL GEOLOGY - PEACE RIVER VALLEY

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MS
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO. CONTROL
CA0038431.4096

REV.
0

FIGURE
5.2-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

5.2.2.2 Bedrock Geology

The bedrock geology in the RSA, in descending order, consists of the Dunvegan Formation, Shaftesbury Formation, Peace River Formation, and the Spirit River Formation.

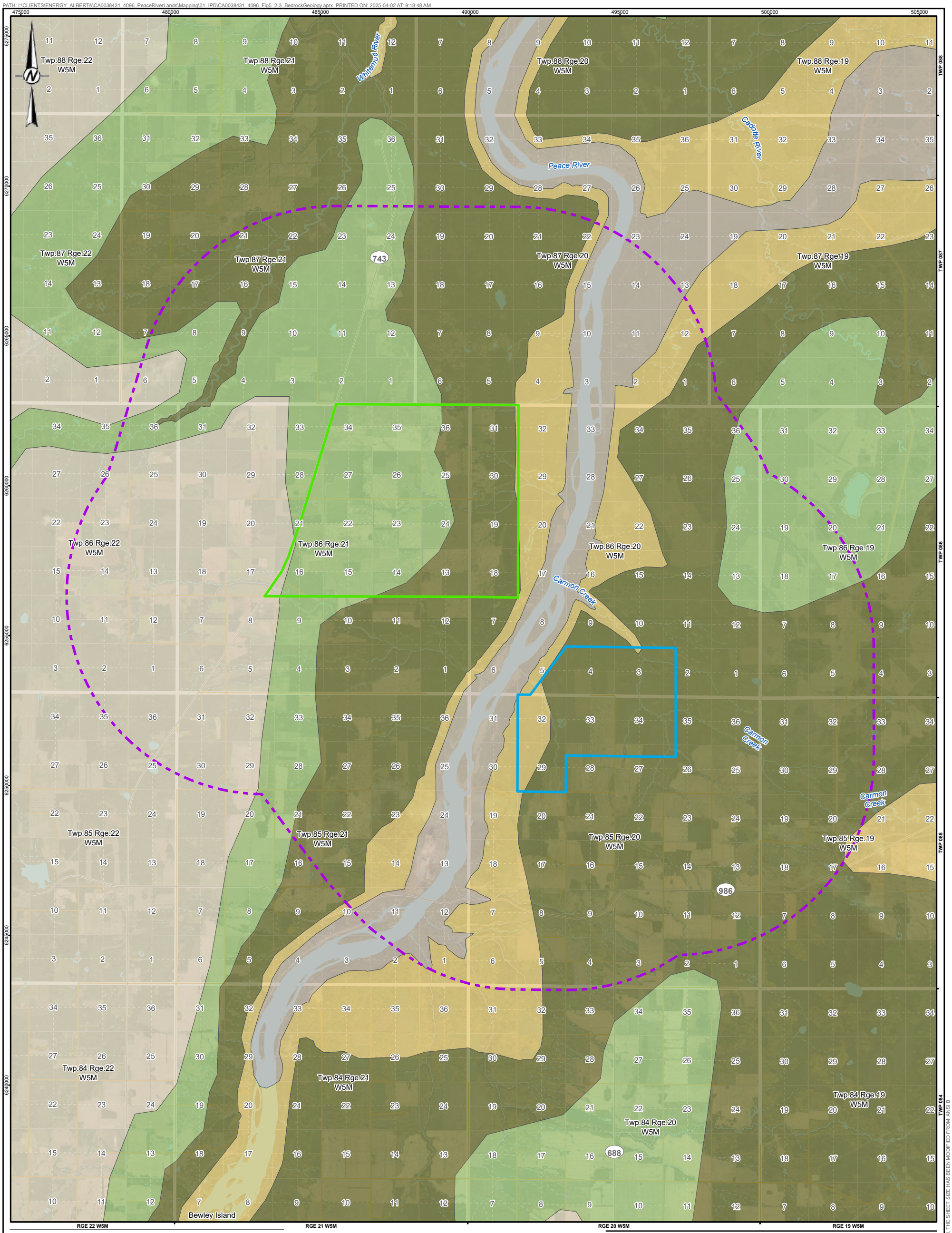
- The Dunvegan Formation consists of marine and non-marine sediments, including deltaic sandstone and thin beds of shale, limestone, and coal (CSPG 1981).
- The mid-cretaceous Shaftesbury Formation is a friable, dark marine shale with thin bentonitic streaks and occasional ironstone (CSPG 1981). It is the dominate bedrock formation in the region and ranges in thickness from 170 m to 400 m.
- The Peace River Formation is a lower Cretaceous unit that consists of marine shale and sand underlying continental sand (Wadell 1957). Within the region, the Peace River Formation is not as prevalent, only being exposed in the Peace River Valley where the overlying formations have been eroded away.
- The Spirit River Formation is made up of clayey sandstone, shales, siltstones lithic greywacke with some coal beds (CSPG 1981). Like the latter, the Spirit River Formation is only exposed in the thalweg of the Peace River.

5.2.2.2.1 Option 1

The bedrock at Option 1 consists mainly of the Shaftesbury Formation, with the Dunvegan Formation present along the western boundary of the LSA (Prior et al. 2013, Figure 5.2-3). The Dunvegan Formation is not mapped on Figure 5.2-3 inside the LSA and therefore is not likely present in most of the LSA. The uppermost bedrock transitions to the Shaftesbury Formation as you move towards the Peace River where the Dunvegan Formation has been eroded by the Peace River Valley (Prior et al. 2013).

5.2.2.2.2 Option 2

Like Option 1, the dominant upper most bedrock unit at Option 2 is the Shaftesbury Formation, transitioning to the Peace River Formation in the northwest corner of the site (Prior et al. 2013).



LEGEND

- WATERCOURSE
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- REGIONAL STUDY AREA
- WATERBODY

BEDROCK GEOLOGY

- DUNVEGAN FORMATION
- PEACE RIVER FORMATION
- SPIRIT RIVER FORMATION
- LOWER SHAFTESBURY AND WESTGATE FORMATIONS
- UPPER SHAFTESBURY, FISH SCALES AND BELLE FOURCHE FORMATIONS

0 2 4

1:120,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

BEDROCK GEOLOGY OBTAINED FROM ALBERTA GEOLOGICAL SURVEY.

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
BEDROCK GEOLOGY

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MS
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO.	CONTROL	REV.	FIGURE
CA0038431.4096		0	5.2-3

5.2.2.3 Hydrogeology

5.2.2.3.1 Aquifers

Within the RSA, the main aquifers are the Grimshaw Gravel and Basal Gravel aquifers that are part of the Buried Valley hydrogeological region. These aquifers within the RSA are known as the Grimshaw gravels, intermediate terrace (more recently referred to as the Old Fort gravel), and the Shaftesbury gravels. The intermediate terrace lies at the base of the Old Fort strath. The Shaftesbury gravel lies at the base of the Shaftesbury strath, which is the floor of the bedrock valley (Slomka et al. 2018). West of the site locations, the hydrogeological region transitions to the regional uplands (Figure 5.2-4). Alluvial gravel and sand deposits along the Peace River are the surficial aquifers in the RSA. The formations of the Dunvegan and Peace River are the bedrock formations of interest that may act as deeper aquifers in the RSA.

Option 1

At Option 1, there is potential for buried basal aquifers (intermediate terrace and Shaftesbury) that have been mapped (Figure 5.2-4) within the site and may be present at a deeper elevation in other areas, particularly within the Peace River Valley. In addition, there are several water wells in the RSA near Option 1 that would support the presence of these aquifers. There is currently no mapping available to indicate a bedrock aquifer in the site; however, as indicated above, the Dunvegan and Peace River Formations may contain thin sand and sandstone beds that are water bearing (Leslie and Fenton 2001).

Option 2

Based on Hartman et al. (2023), there is the potential for the presence of basal material that infilled the buried valleys below Option 2, shown as the Buried Valley Aquifer on Figure 5.2-4. As noted above, these basal aquifers are described as the intermediate terrace and the Shaftesbury gravel (Slomka et al. 2018). In addition, there are several water wells in the RSA near Option 2 that would support the presence of these aquifers. There is currently no mapping available to indicate a bedrock aquifer in the site; however, as indicated above, the Dunvegan and Peace River Formations may contain thin sand and sandstone beds that are water-bearing (Leslie and Fenton 2001).

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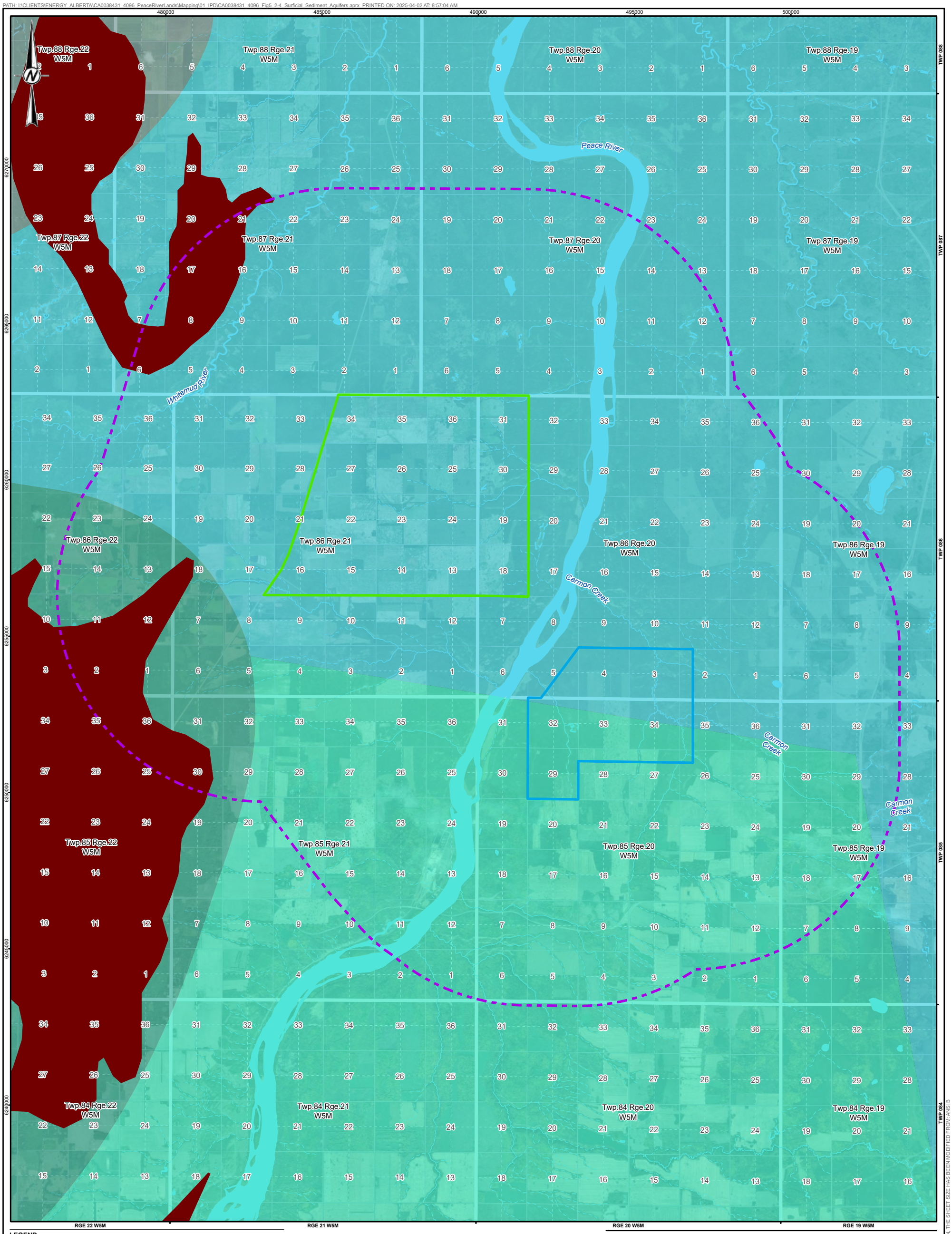

LEGEND

- WATERCOURSE
- GRIMSHAW GRAVEL
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- REGIONAL STUDY AREA
- WATERBODY

AQUIFERS

- KNOWN BURIED VALLEY
- KNOWN PLAINS/UPLAND
- POTENTIAL BURIED VALLEY
- POTENTIAL PLAINS/UPLAND

0 2 4

1:115,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

AQUIFERS OBTAINED FROM ALBERTA GEOLOGICAL SURVEY.
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CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
SURFICIAL SEDIMENT AQUIFERS

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MS
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO.	CONTROL	REV.	FIGURE
CA0038431.4096		0	5.2-4

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5.2.2.3.2 Local Groundwater Users

A search of information from the Alberta Water Well Database was completed in September 2024 for the RSA. Detailed information can be found on Figure 5.2-5 and in Appendix E.

A total of 26 water wells are located within the Option 1 RSA; 39 water wells are located within the Option 2 RSA; and 3 water wells are located in both RSAs. Since the 3 wells located in both RSAs are closer to Option 2, they are discussed as part of the Option 2 RSA. Of the total identified wells, the following well uses are identified:

- 36 are labelled as domestic and/or stock wells
- 13 as industrial wells
- 7 as observation wells
- 6 as unknown
- 3 as monitoring wells
- 2 as municipal wells
- 1 other well (undefined)

The withdrawal wells are the main wells of focus as they have the potential to be groundwater sources for local communities or private landowners and should be properly accounted for to eliminate any risk for the users in the area.

Option 1

Of the 29 wells in the Option 1 RSA, 3 well records have noted screened completion depths, and their depth ranges are as follows:

- 0 – 9.9 m BGS: 2 Wells
- 10 – 19.9 m BGS: 1 Wells

Based on the depth of the well screens and mapping information, the wells are likely completed in the basal sediments or sandstone sediments.

Option 2

Within the Option 2 RSA of the 42 well records, there are a total of 17 water wells with screened/perforated completion depths. Ranges for bottom of screen depths are as follows:

- 0 – 9.9 m BGS: 1 Wells
- 10 – 19.9 m BGS: 7 Wells
- 20 – 29.9 m BGS: 6 Wells
- 30 – 39.9 m BGS: 3 Wells

Based on the depth of the well screens, mapping information, and drilling reports, it appears that the wells are likely completed in the basal sediments.

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480000 485000 490000 495000 500000

6270000 6260000 6250000 6240000

Twp.88 Rge.22 W5M
Twp.88 Rge.21 W5M
Twp.88 Rge.20 W5M
Twp.88 Rge.19 W5M
Twp.87 Rge.22 W5M
Twp.87 Rge.21 W5M
Twp.87 Rge.20 W5M
Twp.87 Rge.19 W5M
Twp.86 Rge.22 W5M
Twp.86 Rge.21 W5M
Twp.86 Rge.20 W5M
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Twp.85 Rge.20 W5M
Twp.85 Rge.19 W5M
Twp.84 Rge.22 W5M
Twp.84 Rge.21 W5M
Twp.84 Rge.20 W5M
Twp.84 Rge.19 W5M

TWP 088 TWP 087 TWP 086 TWP 085 TWP 084

Peace River
Jackfish Creek
Whitemud River
Carmon Creek
Carmon Creek
Carmon Creek

743 986 688

399975 400033 399973 357203 359395 359235 398526 359396 398524 359245 359244 497610 492656 359241 359242 495172 359243 359394 359233 359232 359234 492655 359240 359231 340185 398522 398521 365010 365009 359118 359119 9516131 9516044 398394 398396 398392 398340 351372 398391 398388 9516027 9516023 9516025 9516026 9516024 9516028 492647 492646 398384 398387 359124 359122 359125 359121 359120 359123 398378 398380 398366 398369

RGE 22 W5M RGE 21 W5M RGE 20 W5M RGE 19 W5M

LEGEND

- GROUNDWATER WELL
- WATERCOURSE
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- REGIONAL STUDY AREA
- WATERBODY

0 2 4
1:115,000 KILOMETRES

NOTE(S)
1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)
GROUNDWATER WELLS OBTAINED FROM GOVERNMENT OF ALBERTA, ALBERTA WATER WELL INFORMATION DATABASE (OR BASELINE WATER WELL TEST DATABASE). RETRIEVED 20240719, FROM HTTP://GROUNDWATER.ALBERTA.CA/WATERWELLS/D/. BASE DATA MAY BE OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED, ALTALIS LTD. © GOVERNMENT OF ALBERTA 2024. ALL RIGHTS RESERVED, OR S&P GLOBAL INC. IMAGERY COPYRIGHT © 20210920 ESRI AND ITS LICENSORS. SOURCE: EARTHSTAR GEOGRAPHICS. USED UNDER LICENSE, ALL RIGHTS RESERVED.

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PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
GROUNDWATER WELLS WITHIN 5.0 KM REGIONAL STUDY AREA OF SITE OPTIONS

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MS
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO.	CONTROL	REV.	FIGURE
CA0038431.4096		0	5.2-5

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25mm
0

5.2.2.4 Seismicity

This section summarizes published records of historical seismicity and seismic hazard in the region around the Option 1 and 2 Project sites. The summary of historical seismicity focuses on earthquakes with moment magnitudes (M_w) of 4.0 and greater because well-engineered structures do not typically suffer damage due to earthquakes smaller than M_w 4.0, although this is not an absolute rule. Various measures of magnitude exist but for this summary all magnitudes are converted to M_w using the equations provided by Halchuk et al. (2015).

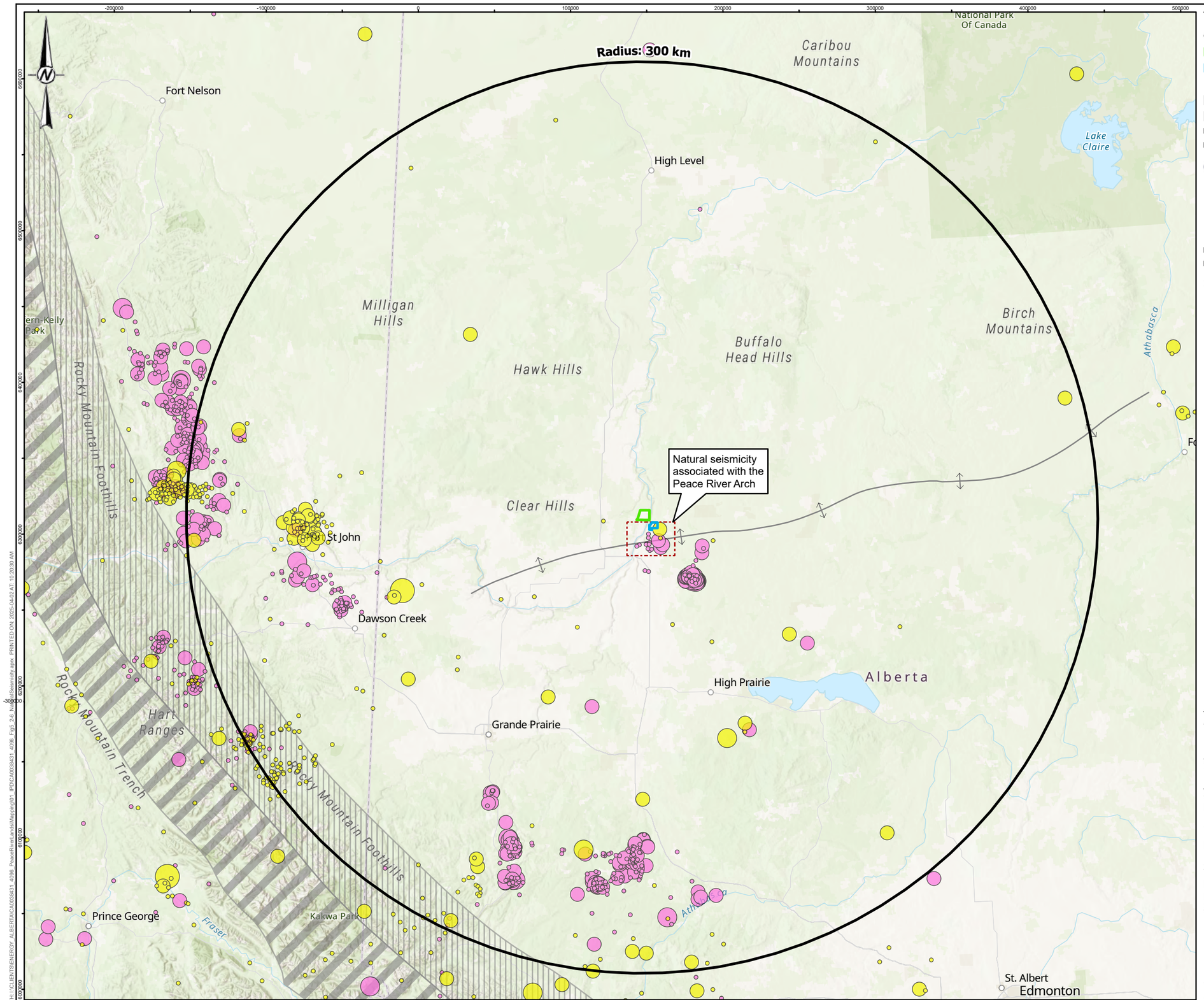
Based on catalogues of historical seismicity for the last several decades from Natural Resources Canada (NRCan), there are 712 earthquakes that are attributed to natural tectonic activity within a radius of approximately 300 km around the Option 1 and 2 Project sites. This is based on records dated prior to March 14, 2025, with an original catalogue magnitude of 2.5 or greater. Thirty-six of these earthquakes have a moment magnitude (M_w) of 4.0 or greater, with the largest event being a M_w 5.4 earthquake on April 14, 2001, about 165 km west-southwest of the Option 1 and 2 sites.

Much of the natural historical seismicity within and around the region is located within or near the Canadian Rocky Mountains and the associated foothills, to the west and southwest of the Option 1 and 2 sites (Figure 5.2-6). The Rocky Mountains are an area of relatively young and tectonically active continental crust, located near the eastern limit of the Canadian Cordillera (Mazzotti et al. 2008). By comparison, the Option 1 and 2 sites and the surrounding areas to the north and east are within the Interior Plains of Canada (Bostock 2014) that comprise ancient (more than 1 billion years old) crystalline basement rock of the North American Craton. These areas are relatively seismically quiescent compared to areas of younger continental crust.

There are also a number of natural historical earthquakes located away from the Rocky Mountains and nearer to the Option 1 and 2 sites (Figure 5.2-6). These earthquakes are interpreted to be associated with the Peace River Arch (Alberta Geological Survey 2020), which is a large cratonic uplift structure within the Interior Plains that formed in the latest Proterozoic (about 550 million years ago) and disturbed the surrounding rocks, leading to the formation of numerous faults in the region (O'Connell et al. 1990).

Natural Resources Canada provides a separate catalogue of historical seismicity interpreted to be induced by anthropogenic activities. Within about 300 km of the Option 1 and 2 sites, this induced earthquake catalogue includes 504 earthquakes with an original catalogue magnitude of 2.5 or greater since 2016 (Figure 5.2-7), of which 22 have a M_w 4.0 or greater. The largest recorded induced earthquake in the region is a M_w 5.1 event on November 30, 2022, about 50 km and 40 km southeast of the Option 1 and Option 2 sites, respectively. Numerous M_w 4+ foreshocks and aftershocks preceded and followed this earthquake. The November 30 mainshock was initially described by the Alberta Geological Survey as 'natural tectonic activity' (Alberta Energy Regulator 2022), but a later study by Schulz et al. (2023) attributed the event to underground wastewater injection associated with petroleum operations. Most other induced earthquakes are located with the Rocky Mountains foothills area and are spatially correlated with the locations of recent and ongoing hydrocarbon production activities, primarily in the Montney and Duvernay geological units near Fort St John, British Columbia, and Fox Creek, Alberta, respectively (Rodríguez-Pradilla et al. 2022).

The relative tectonic stability of the Interior Plains is reflected in the seismic hazard values published as part of the 2020 National Building Code of Canada (NRCC 2022). Mean horizontal peak ground acceleration (PGA) at various annual exceedance probabilities are listed for the Option 1 and 2 sites as retrieved from NRCan (2021). The values shown are calculated for a seismic ground condition represented by a time-averaged shear-wave velocity across the upper 30 m below ground surface (i.e., V_{S30}) of 450 m/s, equivalent to Site Class C.



LEGEND

- 300 KM FROM PEACE REGION NPP
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- PEACE RIVER ARCH AXIS
- ROCKY MOUNTAINS
- ROCKY MOUNTAIN FOOTHILLS

NATURAL EARTHQUAKES (PRE-2011; HALCHUK ET AL. 2015)

MAGNITUDE (M_W)

- ≥ 5.0
- 4.0 TO 4.9
- 3.0 TO 3.9
- < 3.0

NATURAL EARTHQUAKES (2011-2025; NRCAN 2025)

MAGNITUDE (M_W)

- 4.0 TO 4.9
- 3.0 TO 3.9
- < 3.0

0 50 100

1:2,500,000 KILOMETRES

REFERENCE(S)

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PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
NATURAL SEISMICITY IN THE PEACE RIVER NUCLEAR POWER PROJECT REGION

CONSULTANT

YYYY-MM-DD	2025-04-02
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PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO.	CONTROL	REV.	FIGURE
CA0038431.4096		0	5.2-6

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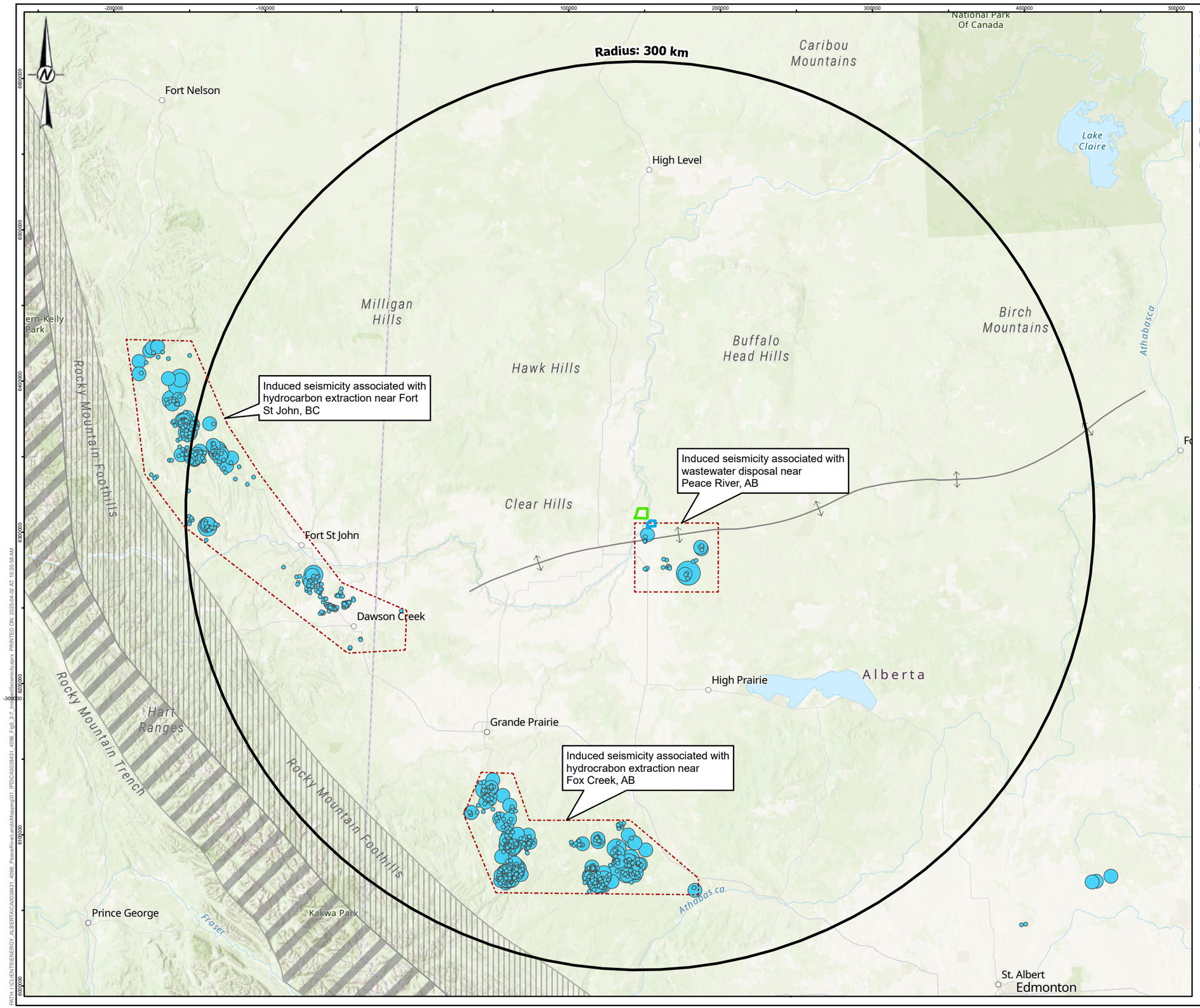

LEGEND

- 300 KM FROM PEACE REGION NPP
- OPTION 1 SITING AREA OF INTEREST
- OPTION 2 SITING AREA OF INTEREST
- PEACE RIVER ARCH AXIS
- ROCKY MOUNTAIN FOOTHILLS
- ROCKY MOUNTAINS

INDUCED EARTHQUAKES (2016-2025; NRCAN 2025)

MAGNITUDE (M_W)

- ≥ 5.0
- 4.0 TO 4.9
- 3.0 TO 3.9
- < 3.0

0 50 100

1:2,500,000 KILOMETRES

REFERENCE(S)

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PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

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ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
INDUCED SEISMICITY IN THE PEACE RIVER NUCLEAR POWER PROJECT REGION

CONSULTANT

YYYY-MM-DD	2025-04-02
DESIGNED	NC
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO.	CONTROL	REV.	FIGURE
CA0038431.4096		0	5.2-7

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Table 5.2-1: Mean Peak Horizontal Ground Acceleration from the 2020 National Building Code of Canada at Various Annual Exceedance Probabilities for the Peace River Nuclear Power Project Region

Probability of Exceedance		Mean PGA (g)	
% in 50 years	Annual	Location 1 Site	Location 2 Site
40% in 50 years	1/100	0.00405	0.00408
10% in 50 years	1/475	0.0194	0.0195
5% in 50 years	1/975	0.0340	0.0343
2% in 50 years	1/2,475	0.0652	0.0658

Source: NRCan 2021.

Note: V_{S30} = 450 m/s.

% = percent; PGA = peak ground acceleration.

The seismic hazard at the Option 1 and 2 sites is relatively low based on the national-level seismic hazard assessment results from NRCan (Table 5.2-1). However, CNSC regulations (REGDOC-1.1.1) require that a site-specific seismic hazard assessment (SSSHA) is undertaken for the final Project site once selected, to inform the seismic design of the site facilities. REGDOC-1.1.1 states that the SSSHA should be undertaken in accordance with the requirements of the latest version of the Canadian Standards Association (CSA N289.2), including:

- Geological and seismological investigations performed for the site, site vicinity, and region including investigation for secondary earthquake effects;
- Development of seismic hazard models including source characterization;
- Probabilistic evaluation of seismic hazard on reference site condition; and
- Probabilistic evaluation of seismic hazard considering local site conditions.

5.2.3 Surface Water Environment

5.2.3.1 Hydrology

5.2.3.1.1 Peace River

The Peace River is the major river in the area (Figure 5.1-2). It flows in a north-easterly direction, originating from Williston Reservoir (located approximately 170 km upstream of the Alberta/British Columbia border) to its confluence with the Athabasca River in Wood Buffalo National Park in northwestern Alberta. The confluence of the Smoky (the largest major tributary in the area) and Peace River is directly upstream of the Town of Peace River. The Williston Reservoir, formed by the building of the Bennett Dam, was filled from 1968 to 1971. The Peace Canyon dam is located 20 km downstream of the Bennett Dam. The Peace River has been regulated by British Columbia Hydro since 1972.

Peace River flows are measured by the Water Survey of Canada approximately 25 km upstream of the Project at Station 07HA001: Peace River at Peace River located at the Town of Peace River. WSC Station 07HA001: Peace River at Peace River is representative of conditions near the Project because no major tributaries join the Peace River between the Town of Peace River and the Project. Drainage area upstream of the Peace River at Peace River (07HA001) Water Survey of Canada station is 194,000 km^2 (WSC 2024). The flow (i.e., discharge) fluctuates from a winter low of about 199 cubic metres per second (m^3/s) to over 10,000 m^3/s in June, with a mean annual discharge of 1,846 m^3/s. The range of long term recorded discharge for 1915 to 2024 is shown in Figure 5.2-8. The long term mean annual total discharge volume recorded was 58.3 billion m^3. The highest annual discharge was 90.9 billion m^3 in 1996, (which was a wet year) and Williston Reservoir was partially drawn down to facilitate the repair of a sinkhole. The lowest annual total discharge volume recorded was 29.1 billion m^3 in 1968 during the first year of filling the Williston Reservoir. The long term recorded discharge volume for 1915 to 2024 is shown in Figure 5.2-9.

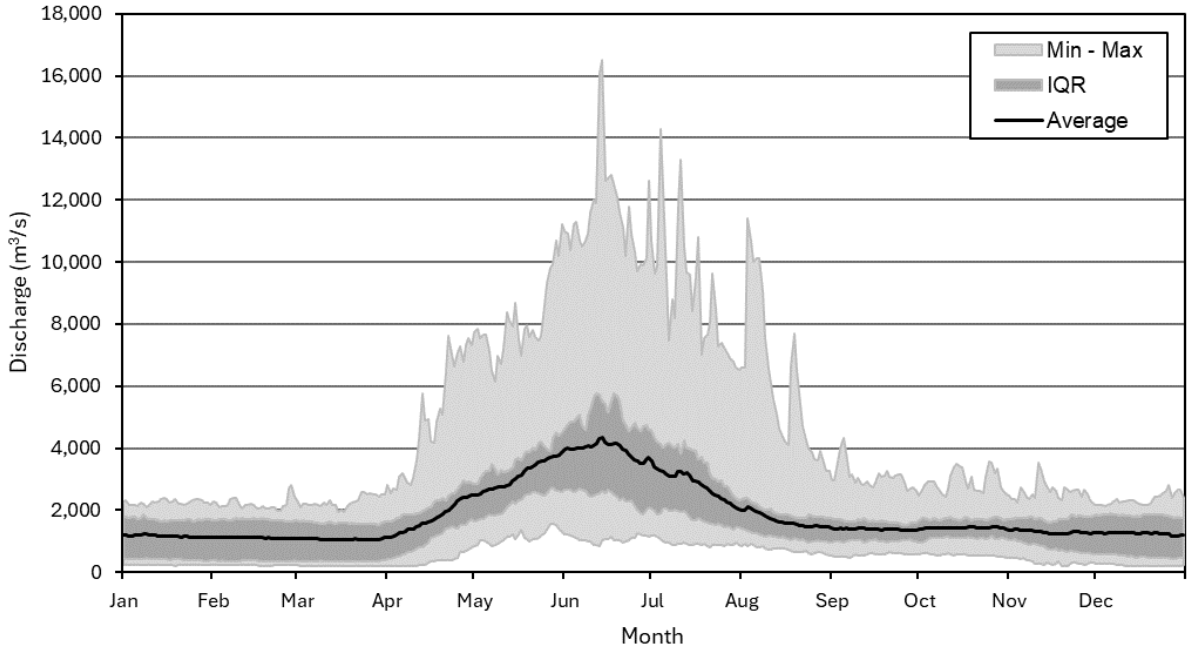


Figure 5.2-8: Long Term Discharge Record 1915 to 2024 for Peace River at Peace River (07HA001)

Note: IQR = interquartile range (25th to 75th percentile).

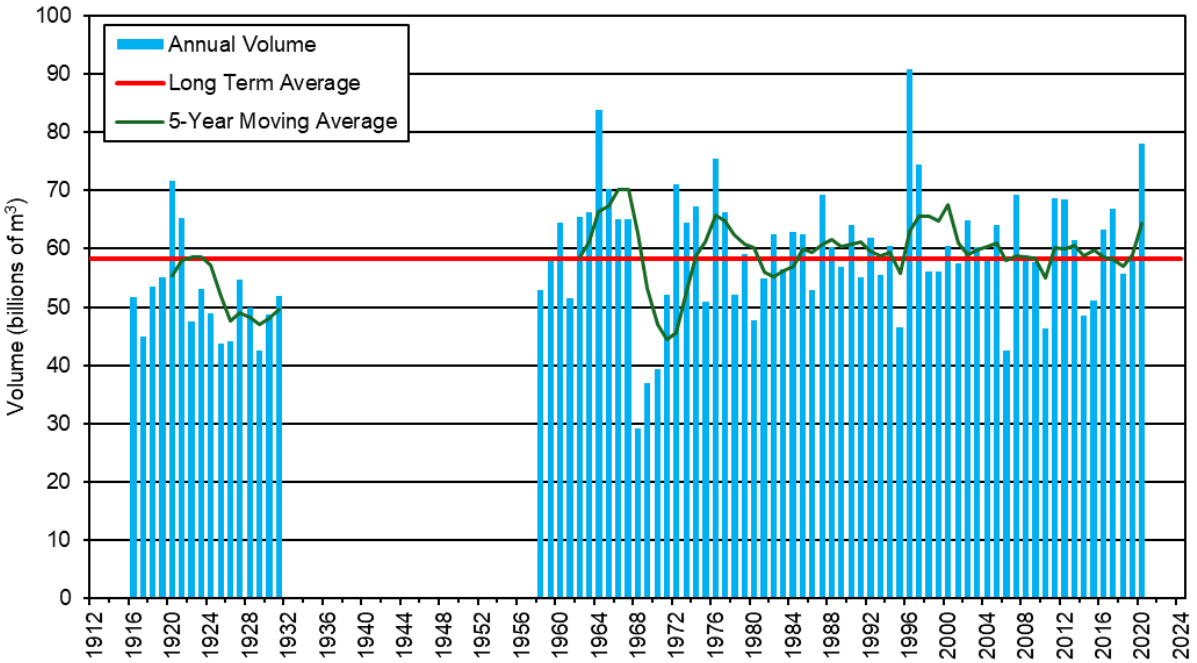


Figure 5.2-9: Long Term Discharge Volume Record 1915 to 2024 for Peace River at Peace River (07HA001)

5.2.3.1.2 Smoky River

The Smoky River is an unregulated tributary that meets up with the Peace River just upstream of Peace River, AB. The drainage area upstream of the Smoky River at Watino (07GJ001) Water Survey of Canada station is 50,300 km^2 (WSC 2024). The flow fluctuates from a winter low of about 20.7 m^3/s to over 2,000 m^3/s in June, with a mean annual discharge of 344 m^3/s. The range of long term recorded discharge for 1915 to 2024 is shown in Figure 5.2-10. The long term mean annual total discharge volume recorded was 10.9 billion m^3. The highest annual discharge was 18.4 billion m^3 in 1965, which was a wet year. The lowest annual total discharge volume recorded was 5.34 billion m^3 in 2006, which was a dry year. The long term recorded discharge volume for 1915 to 2024 is shown in Figure 5.2-11.

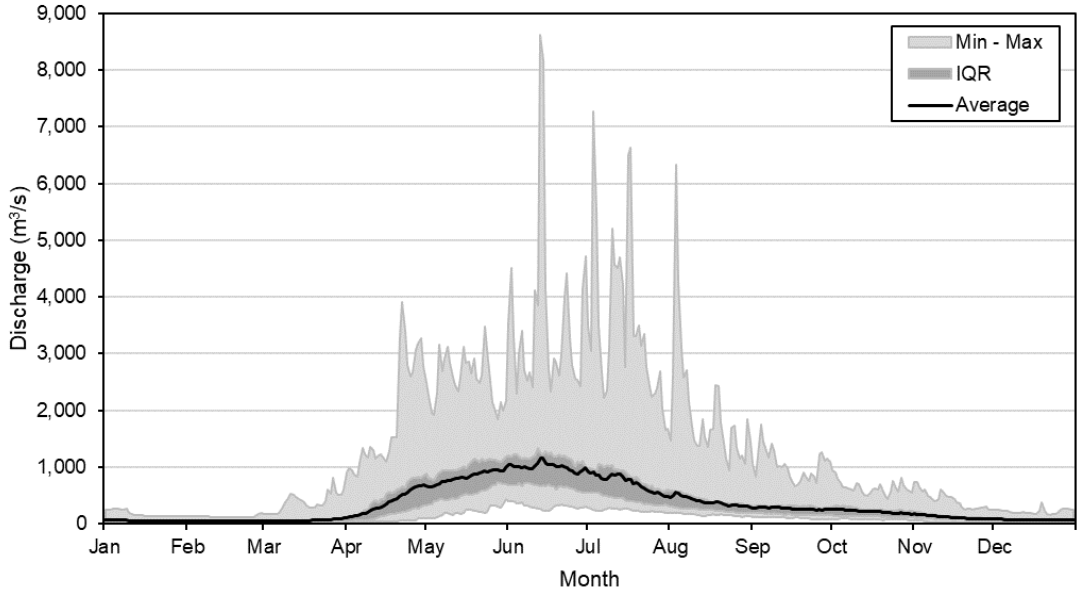


Figure 5.2-10: Long Term Discharge Record 1915 to 2024 for Smoky River at Watino (07GJ001)

Note: IQR = interquartile range (25th to 75th percentile).

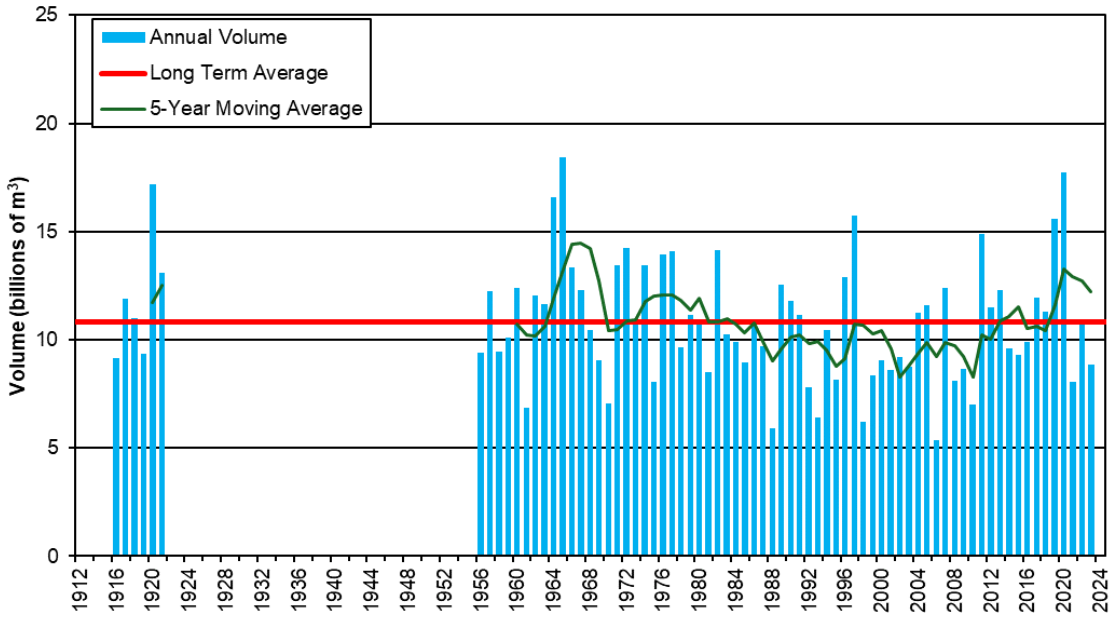


Figure 5.2-11: Long Term Discharge Volume Record 1915 to 2024 for Smoky River at Watino (07GJ001)

5.2.3.2 Surface Water Quality

Point source inputs to the Peace River in the vicinity of the alternate Project sites include effluent discharges from the Town of Peace River and the bleached kraft pulp mill operated by Daishowa-Marubeni International Ltd. Non-point source inputs include those from agricultural practices, oil and gas exploration, pipelines, and forestry activities. The Smoky River enters the Peace River upstream of the Town of Peace River (between Shaftsburry and Peace River). Long-term water quality monitoring stations in the vicinity of the alternate Project sites include the Peace River upstream of Smoky River (AB07FD0135), Smoky River at Watino (AB07GJ0010), Peace River above confluence of Whitemud River (AB07HA0230), and Peace River at Fort Vermilion (AB07HF0010) (GOA 2024b). The station Peace River above confluence of Whitemud River (AB07HA0230), located 50 km downstream of the Project, is the closest station downstream of the Project on the Peace River and most representative publicly available long term monitoring station for conditions in the Peace River adjacent to the Project.

Water quality data reviewed for this middle reach of the Peace River (i.e., immediately upstream of the Smoky River confluence to Fort Vermillion) showed that the concentrations of most water quality parameters increased with distance downstream, though remained relatively low (Table 5.2-2 and Table 5.2-3). Chronic water quality guidelines for the protection of aquatic life (GOA 2018) have been exceeded for some metals at all stations and for some nutrients at some stations (e.g., nitrogen species and elevated phosphorus concentrations) from 1988 to 2024 (Table 5.2-2 and Table 5.2-3). The large volume of water in the Peace River assimilates existing sources of nutrient and organic wastes.

Water quality of the upper, middle and lower reaches of the Peace River has also been assessed as part of the Alberta River Water Quality Index (GOA 2017a). From 1996 to 2016, the Smoky/Peace River stations have consistently received index ratings of 'good', except for 2011 and 2012 when the downstream Peace River station rated 'fair'. The lower scores were likely due to higher summer precipitation throughout the basin and the resulting higher flows as recorded by the Water Survey of Canada in the river (GOA 2017a). Seasonal and annual variation has been observed for parameter concentrations and runoff events associated with rainfall and snowmelt, which can lead to additional loading of non-point source contaminants to rivers.

The Peace River has a relatively high sediment load that tend to be highest in spring, with declines in the summer and fall. Suspended sediment concentrations (and turbidity) regularly exceed the Canadian Water Quality Guidelines for Aquatic Life (Jacques Whitford Limited 2006).

Table 5.2-2: Water Quality Summary Statistics for Select Parameters in the Peace River and Smoky River Upstream of the Project Sites, 1988 to 2024

Parameter	Unit	Peace River Upstream of Smoky River (AB07FD0135)[a]				Smoky River at Watino (AB07GJ0010)[a]			
		Median	Minimum	Maximum	% Above Guideline[a]	Median	Minimum	Maximum	% Above Guideline[b]
Temperature	°C	6.2	-0.5	20	-	4.7	-1.0	22	-
pH	unitless	8.1	7.2	9.0	-	8.0	6.8	9.1[(ca)]	0.5
Dissolved oxygen	mg/L	12	8.7	15		11	6.9	15	-
Total dissolved solids	mg/L	120	48	270	-	210	92	370	-
Total suspended solids	mg/L	13	<1.0	7,500	-	14	<0.4	6,100	-
Chloride	mg/L	<1.0	<0.5	3.3	-	3.1	0.30	31	-
Nitrate	mg-N/L	0.053	<0.003	0.67	-	0.036	<0.003	1.1	-
Total ammonia	mg-N/L	<0.05	0.010	0.27	-	0.040	<0.01	0.41[(Ca)]	0.2
Total phosphorus	mg-P/L	0.016	<0.003	4.9	-	0.022	<0.003	3.0	-
Chlorophyll a	mg/m^3	1.3	0.070	6.4	-	0.80	0.080	18	-
Total cadmium	mg/L	0.000044	0.0000060	0.0035[(Aa,Ca)]	16	0.000041	0.0000020	0.0040[(Aa,Ca)]	15
Total copper	mg/L	0.0013	0.00060	0.14[(Aa,Ca)]	12	0.0022	<0.0002	0.053[(Aa,Ca)]	20
Total lead	mg/L	0.00037	0.000019	0.062[(Ca)]	18	0.00097	0.000074	0.10[(Ca)]	16
Total mercury	mg/L	0.0000020	<0.00000008	0.00049[(Aa,Ca)]	22	0.0000067[(Ca)]	<0.00000008	0.00024[(Aa,Ca)]	16
Total nickel	mg/L	0.0014	<0.000005	0.16[(Ca)]	1.0	0.0024	<0.000005	0.073[(Ca)]	1.0
Total uranium	mg/L	0.0052	0.00033	0.0066	-	0.00068	0.00035	0.0076	-
Total zinc	mg/L	0.0033	0.00040	0.33[(Ca)]	11	0.0068	<0.0001	0.19[(Ca)]	14

Notes:
(a) Long-term monitoring station water quality data from the GOA Water Quality Data Portal (GOA 2024b).
(b) % above guideline represents the percentage of results above chronic guidelines for the protection of aquatic health (GOA 2018).
(Aa) concentration is higher than the acute aquatic life guideline (GOA 2018).; (Ca) concentration is higher than the chronic aquatic life guideline (GOA 2018).
% = percentage;°C = degrees Celsius; - = no guideline or no exceedances; mg/L = milligrams per litre; mg-N/L = milligrams as nitrogen per litre; mg-P/L = milligrams as phosphorus per litre; mg/m^3 = milligrams per cubic metre; GOA = Government of Alberta.

Table 5.2-3: Water Quality Summary Statistics for Select Parameters in the Peace River Downstream of the Project Sites, 1988 to 2024

Parameter	Unit	Peace River above Whitemud River (AB07HA0230)[a]				Peace River at Fort Vermilion (AB07HF0010)[a]			
		Median	Minimum	Maximum	% Above Guideline[a]	Median	Minimum	Maximum	% Above Guideline[b]
Temperature	°C	4.7	-0.4	21	-	2.8	-0.6	23	-
pH	unitless	8.1	6.3(Ca)	9.6(Ca)	4.0	7.9	6.9	9.4(Ca)	1.0
Dissolved oxygen	mg/L	11	8.5	15	-	12	5.4(Ca)	15	0.6
Total dissolved solids	mg/L	130	68	190	-	136	88	298	-
Total suspended solids	mg/L	15	<1.0	1,300	-	19	<0.4	6,800	-
Chloride	mg/L	1.1	<1.0	7.5	-	1.4	<0.5	20	-
Nitrate	mg-N/L	0.055	<0.003	3.0(Ca)	1.0	0.060	<0.003	0.47	-
Total ammonia	mg-N/L	<0.015	<0.01	0.080	-	0.020	<0.01	0.33	-
Total phosphorus	mg-P/L	0.017	<0.003	<3.0	-	0.021	<0.003	4.5	-
Chlorophyll a	mg/m^3	1.5	<0.3	9.8	-	1.3	0.14	9.1	-
Total cadmium	mg/L	0.000040	<0.000002	0.0010(Ca)	12	0.000065	0.0000050	0.0040(Aa,Ca)	21
Total copper	mg/L	0.0014	0.00061	0.020(Aa,Ca)	12	0.0020	0.00010	0.080(Aa,Ca)	23
Total lead	mg/L	0.00048	0.000025	0.019(Ca)	12	0.00084	0.000018	0.074(Ca)	23
Total mercury	mg/L	0.0000024	0.00000049	<0.0001(Aa,Ca)	18	0.0000059(Ca)	0.00000014	0.00024(Aa,Ca)	18
Total nickel	mg/L	0.0014	0.00022	0.025	-	0.0019	0.00013	0.10(Ca)	0.9
Total uranium	mg/L	0.00055	0.00044	0.0024	-	0.00058	0.00026	0.0080	-
Total zinc	mg/L	0.0026	0.00040	0.060(Ca)	5.0	0.0064	0.00047	0.25(Ca)	16

Notes:

(a) Long-term monitoring station water quality data from the GOA Water Quality Data Portal (GOA 2024b).

(b) % above guideline represents the percentage of results above chronic guidelines for the protection of aquatic health (GOA 2018).

(Aa) concentration is higher than the acute aquatic life guideline (GOA 2018).; (Ca) concentration is higher than the chronic aquatic life guideline (GOA 2018).

% = percentage;°C = degrees Celsius; - = no guideline or no exceedances; mg/L = milligrams per litre; mg-N/L = milligrams as nitrogen per litre; mg-P/L = milligrams as phosphorus per litre; mg/m^3 = milligrams per cubic metre; GOA = Government of Alberta.

5.2.3.3 Fish and Fish Habitat

The Project location has been sited to avoid water bodies that have the potential to provide fish habitat. Apart from the Peace River, which will be used to support water requirements for the Project, a review of the Alberta Environment and Protected Areas (AEPA) Fish and Wildlife Management Information System (FWMIS; AEPA 2024a) water layer database shows several small tributaries to the Peace River overlap with Option 1 and one named watercourse, Carmon Creek, including its tributaries, and one unnamed tributary to the Peace River overlap with the proposed footprint of Option 2. A review of existing fish capture information was completed using the FWMIS internet mapping tool (AEP 2024) with a search area that included the entirety of all watercourses crossed by the Project. FWMIS fish capture records in Carmon Creek document small-bodied forage species including Brook Stickleback (*Culaea inconstans*), and sport fish including Northern Pike (*Esox Lucius*) and Walleye (*Sander vitreus*). No records of fish presence are available for the unnamed tributaries overlapping with Option 1, and the unnamed tributary to Peace River that overlaps with Option 2; however, fish and fish habitat may still be present within these waterbodies and will require further investigation.

More broadly, the Project is located within the Peace River watershed. The headwaters of the Peace River originate in British Columbia, and it flows through Alberta to its confluence with the Athabasca River and ultimately drains to the Arctic Ocean via the Mackenzie River system in the Northwest Territories. The Peace River in northeastern British Columbia is regulated by a system of three hydroelectric dams: the W.A.C. Bennett Dam, Peace Canyon Dam, and the Site C Dam, which form an integrated system for upstream flow regulation.

Reduced mean annual peak flows and diurnal fluctuations in flow contribute to alteration of habitat and fish communities (Prowse and Conly 1996), including:

- Altered temperature regime that has permitted cold-water species to extend their downstream limit of distribution;
- Reduced capacity to transport sediments, which contributes to channel narrowing and altered habitats in some areas of the river;
- Ice regime that restricts the availability of overwintering habitat; and
- Diurnal fluctuations in water level that reduces availability of habitats.

The Peace River near the Project is a large permanent watercourse with a broad channel form and generally irregular meander pattern with frequent permanent islands. The Peace River in the vicinity of the Project is a Class C watercourse with a Restricted Activity Period (RAP) from April 16 to July 15 (ASRD 2006). Shallow side channels, snyes, and backwaters associated with sandbars near are generally common throughout the Peace River in the vicinity of the Project; riverbanks are generally steep, terraced and eroding, and generally comprised of fine materials. The Peace River has a seasonally high sediment load that typically is the highest in spring and declines in summer and

fall. Suspended sediment concentrations (and turbidity) regularly exceed the Canadian Water Quality Guidelines for Aquatic Life (Jacques Whitford Limited 2006).

Existing fish inventory and fish habitat information for the Peace River was obtained from a desktop review of the AEPA FWMIS (AEPA 2024a). The spatial extent of this database review included an approximately 10 km long section of the Peace River, spanning 5 km upstream and 5 km downstream of the proposed Project. The 5 km search area within the Peace River (i.e., approximately 5 km upstream from the Project to approximately 5 km downstream from the Project) was selected for the desktop review because it encompasses the largest section of the Peace River that can be queried within the FWMIS database, which allows up to a 6 km radius search. This search distance is typically sufficient to represent the expected fish species present within the Peace River near the Project and identify any other waterbodies with records of fish within the 5 km buffer.

A total of 32 fish species have been documented within the Peace River, 12 of which have been documented within 5 km upstream and 5 km downstream of the Project (Table 5.2-4; AEPA 2024a). Sportfish species that have been found in the vicinity of the Project include Burbot (*Lota lota*), Goldeye (*Hiodon alosoides*), Northern Pike, Mountain Whitefish (*Prosopium williamsoni*), Walleye, and Yellow Perch *(Perca flavescens*). Large-bodied, non-sport fish species include Longnose Sucker (*Catostomus catostomus*) and White Sucker (*Catostomus commersonii*). Small-bodied/forage fish species include Flathead Chub (*Platygobio gracilis*), Lake Chub (*Couesius plumbeus*), Spottail Shiner (*Notropis hudsonius*), and Trout-Perch (*Percopsis omiscomaycus*).

The unnamed watercourse overlapped by the Project in Option 2 is not considered within the potential range or critical habitat for any federally listed species. The Project is not anticipated to impact aquatic species at risk.

Table 5.2-4: Fish species documented in the Peace River and within 5 km upstream and 5 km downstream of the Project

Common Name	Scientific Name	Documented in the Peace River	Documented in the Peace River within 5 km of Project
Arctic Grayling	***Thymallus arcticus***	**Yes**	**No**
Bull Trout (Western Arctic populations)	***Salvelinus confluentus***	**Yes**	**No**
Brook Stickleback	*Culaea inconstans*	Yes	Yes
Burbot	*Lota lota*	Yes	Yes
Emerald Shiner	*Notropis atherinoides*	Yes	No
Flathead Chub	*Platygobio gracilis*	Yes	Yes
Finescale Dace	***Chrosomus neogaeus***	**Yes**	**No**
Fathead Minnow	*Pimephales promelas*	Yes	No
Goldeye	*Hiodon alosoides*	Yes	Yes

Table 5.2-4: Fish species documented in the Peace River and within 5 km upstream and 5 km downstream of the Project

Common Name	Scientific Name	Documented in the Peace River	Documented in the Peace River within 5 km of Project
Kokanee	*Oncorhynchus nerka*	Yes	No
Lake Chub	*Couesius plumbeus*	Yes	Yes
Lake Trout	***Salvelinus namaycush***	**Yes**	**No**
Lake Whitefish	*Coregonus clupeaformis*	Yes	No
Longnose Dace	*Rhinichthys cataractae*	Yes	No
Longnose Sucker	*Catostomus catostomus*	Yes	Yes
Largescale Sucker	***Catostomus macrocheilus***	**Yes**	**No**
Mountain Whitefish	*Prosopium williamsoni*	Yes	Yes
Ninespine Stickleback	***Pungitius pungitius***	**Yes**	**No**
Northern Redbelly Dace	***Phoxinus eos***	**Yes**	**No**
Northern Pike	*Esox lucius*	Yes	Yes
Northern Pikeminnow	***Ptychocheilus oregonensis***	**Yes**	**No**
Pearl Dace	***Margariscus margarita***	**Yes**	**No**
Prickly Sculpin	*Cottus asper*	Yes	No
Redside Shiner	*Richardsonius balteatus*	Yes	No
Rainbow Trout (Athabasca River populations)	*Oncorhynchus mykiss*	Yes	No
Slimy Sculpin	*Cottus cognatus*	Yes	No
Spoonhead Sculpin	***Cottus ricei***	**Yes**	**No**
Spottail Shiner	*Notropis hudsonius*	Yes	Yes
Trout-perch	*Percopsis omiscomaycus*	Yes	Yes
Walleye	*Sander vitreus*	Yes	Yes
White Sucker	*Catostomus commersoni*	Yes	Yes
Yellow Perch	*Perca flavescens*	Yes	No

Note:

Fish Species in **bold** are listed within provincial and/or federal species at risk lists.

Species at risk are discussed in Section 5.3.

5.2.4 Terrestrial Environment

5.2.4.1 Terrain and Soil

5.2.4.1.1 Option 1

The Option 1 study area is located in the Cadotte Plain Physiographic District, which is part of the Peace River Lowland (Pettapiece 1986). The Cadotte Plain is described as veneers and blankets of glaciolacustrine sediments overlying undulating till. The landscape within the Option 1 is level to gently undulating; however, the northwestern corner of Option 1 is adjacent to the steep slopes of the Peace River Valley.

5.2.4.1.2 Option 2

The Option 2 is located in the Manning Plain Physiographic District, which is part of the Peace River Lowland (Pettapiece 1986). The Manning Plain is characterized by level glaciolacustrine sediments and undulating glaciofluvial sediments. The landscape within Option 2 is gently sloping from the west to the east and towards the Peace River Valley.

5.2.4.2 Vegetation

The Option 1 and Option 2 sites are in the Dry Mixedwood Natural Subregion of the Boreal Forest Natural Region of Alberta (Downing and Pettapiece 2006). This subregion is generally characterized as having low relief, with level to undulating surfaces. Vegetation within this subregion is transitional between the Central Parkland and Central Mixedwood Subregions, with community types common to all three. Aspen (*Populus tremuloides*) is an important species, occurring in both pure and mixed stands. Balsam poplar (*Populus balsamfina*) occurs on moister sites, usually in depressions or along streams, but may occur in upland aspen forests. White spruce (*Picea glauca*) and balsam fir (*Abies balsamea*) can be expected to replace aspen and balsam poplar as stands mature; however, frequent fire seldom permits this to occur and pure deciduous stands are common in the southern part of the Dry Mixedwood Subregion. Mixedwood forests generally contain a mosaic of deciduous forest patches with species typical of each mosaic occurring through the stand. Dry, open and sandy upland areas are dominated by jack pine (*Pinus banksiana*). Peatlands are dominated by black spruce (*Picea mariana*) and tamarack (*Larix larvina*).

A total of 101 rare vascular plant species and 65 rare non-vascular plants potentially occur in the Boreal Forest (Moss 1983, Gould 2006). Species at risk are discussed in Section 5.3.

Over 50% of the Peace River and central Alberta portions of the Dry Mixedwood Natural Subregion have been cultivated (Alberta Parks 2014). Consequently, because Option 1 and Option 2 sites are predominantly agricultural land, non-native and other invasive species are likely present at both sites.

5.2.4.3 Wildlife and Wildlife Habitat

Several terrestrial wildlife may occur in the region. Most wildlife species in the region depend primarily on forested habitats. There is a prevalence of agricultural development and lack of contiguous tracts of forest in the area surrounding the Project. As such, wildlife use of the Option 1 and Option 2 sites are likely limited to species tolerant of anthropogenic disturbance (e.g., mice, coyotes, deer, corvid species) and most forest inhabited wildlife species are not expected to make use of the two options for the Project site.

Key Wildlife and Biodiversity Zones (KWBZ) are within 2 km of the Project Option 1 (to the east) and overlap with the western portion of Project Option 2 (GOA 2024c). The KWBZs are considered by a combination of key winter ungulate habitat and habitat with higher potential for biodiversity (GOA 2015) and are often associated with river valleys.

5.2.4.3.1 Option 1

Project Option 1 intersects grizzly bear (*Ursus arctos*) Support Zone. The Support Zone is intended to help maintain grizzly bears, particularly females and females with cubs, with home ranges that only partially occur in the Recovery Zone (AEP 2020). The Recovery Zone is comprised of Core and Secondary Areas, where Core Areas are areas of high habitat value and generally low mortality risk, and Secondary Areas are areas of good habitat reflecting the broader range of grizzly bear habitat. The Support Zone considers the 20-year history of grizzly bear occurrences, habitat potential, topographical relief, conflict potential, and proximity to a Recovery Zone (AEP 2020).

5.2.4.3.2 Option 2

Option 2 does not overlap sensitive terrestrial wildlife species ranges. An approximate 1 km buffer was applied to the Option 2 site during the FWMIS searches (GOA 2024a).

5.3 Species At Risk

Federal and provincial species at risk are discussed below for fish, vegetation, birds and migratory birds and wildlife.

5.3.1 Fish

Ten of the fish species documented within the Peace River system are listed within the provincial and/or federal species at risk lists. However, none of the fish species documented within 5 km of the Project are federally listed under the *Species at Risk Act* (SARA) or provincially listed (AEPA 2023) as ‘Endangered’, ‘Threatened’, or of ‘Special Concern’.

In the whole of the Peace River system, Arctic Grayling (*Thymallus arcticus)* are provincially designated as ‘May Be at Risk’ according to the General Status of Alberta Wild Species (AEPA 2023) but are not listed federally under SARA. Lake Trout (*Salvelinus namaycush*) are provincially designated as ‘Sensitive’ (AEPA 2023) but are not listed federally under SARA. Bull Trout (*Salvelinus*

confluentus; Western Arctic populations) are provincially designated as 'At Risk' according to the General Status of Alberta Wild Species (AEPA 2023) and are federally listed as 'Special Concern' by SARA.

Bull Trout (Western Arctic Populations) have been documented in the Peace River, but they have been found to be confined to the upstream reaches of the river. Their current known range does not extend to within 5 km of the proposed Project (Rodtka 2009), and no critical habitat has been identified in the Peace River downstream of the Town of Peace River (DFO 2024).

Rainbow Trout (*Oncorhynchus mykiss;* Athabasca River populations) are provincially designated as 'At Risk' for populations within the Athabasca River according to the General Status of Alberta Wild Species (AEPA 2023) and the Athabasca River population is listed federally as 'Endangered' by SARA. Although Rainbow Trout populations occur in the upper Peace River system in British Columbia, native Rainbow Trout in Alberta are found only in the upper Athabasca River watershed (DFO 2020). Rainbow Trout in Alberta found outside of the upper Athabasca River are introduced populations and are listed as 'Secure' (AEPA 2023). No critical Rainbow Trout habitat has been identified in the Peace River (DFO 2024).

5.3.2 Vegetation

Federally, SARA and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the status of species of Special Conservation Concern (SCC) in Canada. Nine candidate species identified by COSEWIC may occur in Alberta's Boreal Forest. Based on records contained in the Alberta Heritage Information Centre Database maintained by Alberta Sustainable Resource Development, there are no documented occurrences of listed plant species within both Option 1 and Option 2 sites (Rintoul 2008; Meijer 2008), likely because they are located predominantly on agricultural lands.

5.3.3 Birds and Migratory Birds

The Project is in the Dry Mixedwood Natural Subregion of the Boreal Forest Natural Region of Alberta, a diverse natural environment that contains a variety of species of wildlife (Alberta Parks 2014; Natural Regions Committee 2006). There are several bird species that are identified as SCC that could occur in the Dry Mixedwood Natural Subregion. Wild vertebrate species in Alberta are assessed in Alberta by the Endangered Species Conservation Committee and Scientific Subcommittee (GOA 2024c).

Several bird species considered as "sensitive" likely reside in the region (e.g., trumpeter swan (*Cygnus buccinator*) at Lac Cardinal). A comprehensive list of SCC that potentially occur within Option 1 and Option 2 sites will be identified and described in detail in the Impact Assessment conducted for the Project, after appropriate bird and bird habitat surveys are completed.

Based on records contained in the FWMIS (AEPA 2024a) no "sensitive" bird species ranges overlap the Option 1 site. An approximate 1 km buffer around the Project study area was applied to the Option 1 sites during the FWMIS searches as this focuses study efforts on the area affected by the Project and accounts for activity restriction setback distances for potential species at risk in the Project area.

Based on records contained in the FWMIS (AEPA 2024a), the Option 2 boundary is approximately 4 and 9 km from sharp-tailed grouse (*Tympanuchus phasianellus*) sensitive range to the northeast and southwest, respectively (GOA 2024c). Therefore, sharp-tailed grouse breeding habitats (e.g., dancing grounds or leks) may occur within the Option 2 site, pending suitable habitat conditions. Trumpeter swan observations (presence) have also historically been recorded on the site (GOA 2024c). Trumpeter swan is considered "Sensitive" in Alberta (GOA 2002). An approximate 1 km buffer around the Project study area was applied to the Option 2 sites during the FWMIS searches. This focuses study efforts on the area affected by the Project and accounts for activity restriction setback distances for potential species at risk in the Project site. The Project site is situated in a predominantly agricultural area and does not contain any major water bodies. The site is generally flat and has historically been used for agricultural purposes.

5.3.4 Wildlife and Wildlife Habitat

Provincially, species at risk are species listed with general and detailed status rankings by the Alberta Endangered Species Conservation Committee and Scientific Subcommittee. These species are listed as 'Threatened', 'Endangered', or 'Special Concern' under Schedule 1 of SARA, or are recommended to be listed under SARA by COSEWIC (GOA 2024a).

The provincial *Wildlife Act* allows for the creation, management, and protection of wildlife areas for wildlife research activities, or for conservation or interpretation of wildlife. These wildlife areas preserve habitats that are critical to migratory birds and other wildlife species, particularly those that are at risk (GOA 2024d). The *Wildlife Act* also protects the important habitat features (e.g., occupied mammal dens, bat hibernacula, and natural mineral licks) and other wildlife species, such as species listed as 'Endangered' or 'Threated' under the *Wildlife Act*, big game animals (e.g., deer and bears), furbearing mammals (e.g., beavers and foxes), bats, and amphibians. Activities may be prohibited that could be harmful to species and to their habitat, unless a permit is issued indicating the permitted activity (GOA 2024c).

Federally, COSEWIC assesses the status of SCC in Canada and recommends species to the Minister of ECCC for listing under SARA. Under SARA, it is illegal to destroy the critical habitat of species at risk that are listed as 'Threated' or 'Endangered' under the Schedule 1 of SARA. Additionally, under SARA, critical habitat is defined as the habitat that is necessary for the survival or recovery of listed Extirpated, Endangered, or Threatened species, and that is identified as critical habitat in a recovery strategy or action plan (GOC 2016). In general, SARA only applies to federal lands. In Canada, most species of birds are protected under the *Migratory Birds Convention Act*, 1994 (MBCA), which is outlined further in Section 7.2.2.

There are no records of federally or provincial listed species or SCC in Option 1 and Option 2 sites. An approximate 1 km buffer was applied to both the Option 1 and Option 2 sites during the FWMIS (AEPA 2024a) searches. Project Option 2 does not intersect sensitive species ranges (AEP 2020).

For Option 1, there is potential for bats of the *Myotis spp*. to occur in the area. Option 1 is within little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) range in Alberta (AEPA 2024b). The Endangered listing of these species in Alberta is based on anticipated declines from White Nose Syndrome. A Recovery Plan has recently been developed to protect the highest priority habitats: hibernacula and maternity roosts (referred to as 'essential roosts') (AEPA 2024b). Where hibernacula or hibernacula habitat are identified, maintenance of surrounding habitat (e.g., foraging) is required and is accomplished through guidelines, such as setting buffers zones to protect habitat, along with timing restrictions for activities that could negatively affect hibernating bats (AEPA 2024b).

Option 1 also overlaps with grizzly bear Support Zone (AEP 2020). The Support Zone is intended to help maintain grizzly bears, particularly females and females with cubs, with home ranges only partially in the Recovery Zone (AEP 2020). The Recovery Zone is comprised of Core and Secondary Areas, where Core Areas are areas of high habitat value and generally low mortality risk, and Secondary Areas are areas of good habitat reflecting the broader range of grizzly bear habitat. The Support Zone considers the 20-year history of grizzly bear occurrences, habitat potential, topographical relief, conflict potential, and proximity to a Recovery Zone (AEP 2020). Grizzly bear is federally listed as 'Special Concern' under Schedule 1 of SARA.

The Chinchaga caribou range is approximately 30 km to the northwest of the Project Option 1, and the Red Earth caribou range is approximately 90 km to the east of Project Option 1 and approximately 85 km northeast of the Project Option 2 (GOA 2017b).

5.4 Land and Resource Use

5.4.1 Traditional Land and Resource Use

Energy Alberta acknowledges that Indigenous Peoples have a long and close (stewardship) relationship with the land and can provide valuable knowledge about the local environment. IAAC and CNSC provide guidance to support the inclusion of Indigenous Knowledge into the Impact Assessment process in accordance with guiding principles and requirements for confidentiality.

Traditional Land and Resource Use is a key valued component of the Environmental Assessment process. Inclusion of Indigenous Knowledge is also an important step in the reconciliation process between Canada and Indigenous Peoples. IAAC advises that proponents consider if their project will have an impact on harvesting areas where traditional lifestyles are practised through activities such as hunting, trapping, fishing, and gathering (IAAC, 2024). IAAC also advises that impact assessment practitioners work with Indigenous Nations and Communities to identify (and map out)

how the project could interact with their traditional territory; keeping in mind that the practice of Indigenous rights can be fluid and should consider many variables IAAC, 2024). The following considerations may assist in identifying the importance of the Project site to Indigenous Nations and Communities:

- It is located within the Indigenous community's traditional territory.
- The Indigenous community claims the area is important.
- The intensity and frequency of traditional and cultural uses in the area.
- The diversity of traditional and cultural uses and experiences in the area.
- The uniqueness of the area to the cultural practices.
- The role the place holds in the community's history and culture (IAAC, 2024).

Energy Alberta will provide opportunities for Indigenous Nations and Communities to determine potential impacts of the Project to changes to access to lands, loss of traditional lands, and ability to hunt, fish, gather, and/or trap, as well as the ability to practise traditional culture, through submitting their own Traditional Land and Resource Use (TLRU) studies to help inform the Impact Assessment process. Energy Alberta recognizes that Indigenous Knowledge (IK) provided by Indigenous Nations and Communities provides meaningful input into the Impact Assessment process, particularly in evaluating impacts to traditional land use, but it also informs on how Indigenous Nations and Communities wish to be included into the Impact Assessment process. The TLRU/IK reports tend to include maps of areas and locations of cultural importance, descriptions of areas and locations of cultural importance and mitigation recommendations. Results of individual Indigenous group's TLRU/IK studies will be analyzed and reported in a manner that is acceptable to the community conducting the study.[2]

Data on TLRU will be sourced solely from the Indigenous Nations and Communities who are potentially impacted by the Project. The Project is located within Treaty 8 territory and Métis Nation of Alberta territory. The IPD is informed by previous IK and TLRU studies and hearing testimony provided by Indigenous Nations and Communities, however, these sources are not intended to replace IK and TLRU for this Project.

[2] As engagement continues and project development advances, the Proponent may request permissions from the Indigenous Nations and communities to provide and include maps of their traditional territories in the IS, if relevant and appropriate. In cases where Indigenous Nations and communities maintain a level of confidentiality surrounding their traditional territories and activities, data sharing agreements may be required. The Proponent also recognizes that traditional territories evolve with time and that the documentation of their territories requires effort and resources and, subsequently, some Indigenous Nations and communities may not yet have a fully defined map of their territory.

Energy Alberta will seek to understand and respect Indigenous governance, rights, protocols, policies, and practices when requesting access to Indigenous Knowledge and gaining permission to use Indigenous Knowledge. Energy Alberta is also engaging with Indigenous Nations and Communities, to determine potential impacts of the Project to health and socio-economic conditions, physical and cultural heritage, as well as the current use of lands and resources for traditional purposes. Use of data provided in TLRU/IK studies will align with OCAP® principles of Ownership, Control, Access, and Possession as outlined by the First Nations Information Governance Centre. Energy Alberta understands that building and maintaining relationships between proponents and Indigenous Nations and Communities help provide that Impact Assessments are effectively informed by IK through every phase of the process. Energy Alberta will work with Indigenous Nations and Communities and knowledge holders to:

- Determine the community protocols and expectations regarding the conduct of Indigenous Knowledge studies to determine how the research is to be conducted and how information will be used;
- Work with the Indigenous Nations and their designated representative to determine how permission will be obtained from a participating Indigenous Nation or knowledge holders;
- Identify how and what Indigenous Knowledge may be useful for Project design, Impact Assessment process, impact prediction and mitigation;
- Determine expectations for handling, sharing, and incorporating Indigenous Knowledge studies; and
- Identify possibilities for scoping the study in a manner that may also contribute to broader goals and priorities of the Indigenous Nation.

5.4.1.1 Traditional Territory

The Indigenous Nations and Communities identified as being potentially impacted by the Project were selected on the basis of:

- Proximity to Project;
- Which Treaty or Government the Group adheres to;
- Potential overlap of the Project with traditional territory;
- Previous interest in nuclear projects; and
- Participation in engagement on the Project to date.

5.4.1.2 Treaty 8

Treaty No. 8 was signed on 21st June 1899 in Northern Alberta, near present-day Grouard Alberta, and includes 41 First Nations. The Treaty territory covers an area of approximately 841,487 km^2 and includes northern Saskatchewan, northern Alberta, and parts of British Columbia and the

Northwest Territories (Madill 1986). Several adhesions were signed in the following years. The rights specified under Treaty No. 8 are protected under Section 35 of the *Constitution Act, 1982*.

When Treaty 8 was negotiated, the text of the written terms and conditions was essentially the same as Treaty 7, with some allowances to reflect local conditions. There was also recognition given the assumption that some of the Indigenous Peoples in the Treaty area might wish to continue traditional economic activities such as hunting, fishing, and trapping, and to resist being restricted to reserve lands. The government at the time made assurances not to force substantial changes to their way of life and that Indigenous Peoples of Treaty 8 would be permitted to hold their land collectively in reserves or 'in severally'; which meant that Indigenous families could have their own small reserve, apart from the other families in the band (Fumoleau 1975). The most important Treaty provisions to the Indigenous communities were the protection of hunting, fishing, gathering, and trapping rights. Oral history from Indigenous Elders indicates that Treaty Eight would not have been signed if the Indigenous Peoples had not been assured that their traditional economy and freedom of movement would be guaranteed (Fumoleau 1975).

Treaty No. 8 permits signatory Nations to "pursue their usual vocations of hunting, trapping, and fishing throughout the tract surrendered" (CIRNAC 2013). Many Treaty 8 Nations assert that the Treaty terms include oral promises made at the time of signing, which should have been documented in the text. As highlighted in *Mikisew Cree First Nation v. Canada*, Treaty No. 8 encompasses promises beyond traditional land use, including "continuity in traditional patterns of economic activity" (SCC 2005).

While Treaty No. 8 does not explicitly mention practices such as gathering or cultural pursuits, these activities are reasonably equivalent or incidental to the expressed Treaty No. 8 harvesting rights. These rights, which sustained Indigenous livelihoods before the Treaty's signing, continue similarly today (SCC 1990a, 1990b, 1996, 1999a, 1999b). Section 12 of the *Natural Resource Transfer Agreement* guarantees the rights of Treaty First Nations in Alberta to take game and fish for food during all seasons of the year on unoccupied Crown lands and on any other lands to which they have a right of access (Alberta 2003).

Treaty 8 Nations identified as potentially effected by this Project include:

1. Athabasca Chipewyan First Nation
2. Beaver First Nation
3. Dene Tha' First Nation
4. Driftpile Cree Nation
5. Duncan's First Nation
6. Horse Lake First Nation
7. Kapawe'no First Nation
8. Little Red River Cree Nation
9. Loon River First Nation
10. Lubicon Lake Band #453
11. Mikisew Cree First Nation
12. Peerless Trout First Nation
13. Sawridge First Nation
14. Sturgeon Lake Cree Nation
15. Sucker Creek First Nation
16. Swan River First Nation
17. Tallcree Tribal Government
18. Whitefish Lake First Nation
19. Woodland Cree First Nation.

5.4.1.3 Métis Communities

Specific Métis Communities identified as potentially impacted by the Project include:

1. East Prairie Métis Settlement
2. Gift Lake Métis Settlement
3. Cadotte Lake Métis Nation
4. Paddle Prairie Métis Settlement
5. Peavine Métis Settlement
6. Fort Chipewyan Métis Nation

Otipemisiwak Métis Government (formerly the Métis Nation of Alberta) signed a self-government agreement in 2023, the Agreement recognizes that the Métis Citizens within Alberta have an inherent right to self-government recognized and affirmed by Section 35 of the *Constitution Act* (1982). OMG and has restructured its previous six regions into 22 newly defined districts grouped into five territories (MNA 2023a).

Harvesting activities for the Métis people of the North Saskatchewan and Lower Athabasca River Territories encompass hunting, trapping, fishing, and plant gathering throughout their area. Specific locations include the Athabasca, Firebag, Clearwater, Richardson, Marguerite, and House rivers; Diane, Namur, Gardiner, McClellan, Mariana, and Crow lakes; Poplar Point and Big Point; and the Birch Mountain Wilderness area (Bishop Law 2012; NGTL 2014, 2015). Big Point is also recognized as a sacred site (Bishop Law 2012).

Métis people from these territories have noted that development in these areas has altered habitats and impaired access, affecting their ability to conduct traditional activities (Bishop Law 2012). They have expressed concerns about potential effects of further development, including increased contaminants affecting the safe use of harvested resources, the creation of barriers impeding traditional activities, impacts on historic and cultural sites near development areas, and the declining ability to engage in traditional activities, which limits the transmission of cultural practices and knowledge to younger generations (Bishop Law 2012; NGTL 2023; NGTL 2014, 2015).

5.4.1.4 Overview of Indigenous Nations and Communities' Potential Topics of Interest

For the purposes of the IPD, a scan of existing community led Indigenous Knowledge studies from potentially effected Indigenous Nations and Communities was conducted. Of all the Indigenous Nations and Communities identified in the IPD, all engaged in traditional activity on the land and primarily within their traditional territory. A level representation of concerns expressed in these studies are included in the preliminary list of topics of interest for Indigenous Nations and Communities presented in Section 3.2.4.

5.4.2 Agriculture

Agricultural data is sourced from Statistics Canada, which divides areas by agricultural census regions. The Project is located in Census Agricultural Region 7 of Alberta. Within this region, agriculture and farmland data is available for the following municipalities: Municipal District (MD) of Northern Lights No. 22, MD of Peace No. 135, MD of Clear Hills No. 21, MD of Fairview No. 136, Birch Hills County, Northern Sunrise County, and MD of Smoky River No. 130.

Since 2006, the number of farms and the total land area in these seven municipalities has fluctuated (Statistics Canada 2007, 2017, 2022a). In 2006, there were 2,373 farms. This number decreased to 1,905 farms in 2011 and further to 1,595 farms in 2016, before slightly increasing to 1,785 farms in 2021.

A similar trend is observed in the total farm area. In 2006, the total farm area was 1,286,293 ha. This decreased to 805,179 ha in 2011, then increased to 809,342 ha in 2016, and further to 1,162,945 ha in 2021. From 2016 to 2021, both the number of farms and land area have increased for the municipalities, which highlights the importance of agriculture within the region.

Additionally, in 2021, the operating revenues (excluding forest products) of the seven municipalities totalled over $809 million, which account for approximately 27.4% of the total operating revenue of the province ($22,215,643,470) (Statistics Canada 2022b). The main crop types produced in the region include barley, canola, wheat, and oats, all of which are showing an increase of production from 2016 to 2021. Livestock also plays a prominent role in the region's landscape. The total number of cattle and calves in the region increased by 22.0% in 2021 from 2016, while the number of pigs has increased by 570.0%.

5.4.3 Tourism

There are a diverse range of activities being promoted within the region. The County of Northern Lights and the Northern Sunrise County have provincial parks, lakes, and local museums (Mighty Peace Tourism 2025). Activities include hiking, hunting, horseback riding, camping, bird watching, and golfing. During the winter, the region offers snowshoeing, cross country skiing, snowboarding, sledding, ice fishing, and watching northern lights.

5.5 Cultural Resources

5.5.1 Option 1

Currently, there are no known historical resources sites recorded in the "Listing of Historic Sites" (ACSW, April 1st, 2024), previously recorded archaeological sites, or the study areas of previous Historic Resource Impact Assessment (HRIA) studies within the Option 1 area. Option 1 is located predominantly within agricultural lands, clear of forest cover. However, it is possible that areas of these lands are native vegetation (e.g., native prairie). In addition, terrain features associated with former Glacial Lake Peace are located within this study area. There is the potential that intact historic resources may be located within this study area.

Due to the scope of the Project, a Historical Resources Overview (HRO) will be submitted with a Historic Resource application to Alberta Arts Culture and Status of Women (ACSW) that provides a desktop analysis of the preferred Project's potential to impact any known or unknown historical resources that may be present, along with recommendations for additional studies, if warranted. Pending the review of the HRO, ACSW will issue a 'Schedule A' document which will detail the *Historical Resources Act* (HRA) requirements or conditions which must be fulfilled for the Project to receive HRA clearance.

The document will include comments on the need for archaeological and paleontological studies and, in some cases, a requirement for Indigenous Nations and Community participation in field programs or interviews related to possible cultural sites within the Option 1 site. It is anticipated that ACSW will minimally require a Historical Impact Assessment for moderate and high potential zones within the Option 1 site.

5.5.2 Option 2

Currently, there are known historical resources sites recorded in the "Listing of Historic Sites" (ACSW, April 1st, 2024) within the Option 2 site. Lands within 4,5,12 and 13 of 29-85-20-W5M and 12 of 20-85-20-W5M have a Historic Resource Value (HRV) of 5p. This listing is a high paleontological resource sensitivity zone and designates lands with high potential to contain a paleontological resource.

Archaeological site HcQg-1 is located within NW-20-85-W5M. This archaeological site has an HRV of 0 and is assessed as unlikely to require further study. The study area for two previous HRIA's are located within Option 2. Permit 84-071 was for the HRIA of the Peace River In-Situ Pilot Project Water Supply Line (Van Dyke 1984). Permit 85-033 was for the HRIA of the Alberta Natural Gas Company Ltd. Gas supply line to Shell Peace River Expansion Project (Loveseth 1985). Although previous studies have been conducted within the study area, there remain unassessed areas of land with the potential to contain an unrecorded intact historic resource. These high potential lands include elevated terrain features in close proximity to hydrological features within intact forest.

5.6 Socio-Economic Environment

The Project is situated in the County of Northern Lights (Option 1) or Northern Sunrise County (Option 2) and is surrounded by several municipalities consisting of MDs, counties, and towns. These include the MD of Peace No. 135, Town of Grimshaw, Clear Hills County, MD of Fairview No. 136, Town of Fairview, Birch Hills County, Northern Sunrise County, Town of Peace River, MD of Smoky River No. 130, and Town of Falher (Figure 5.6-1). For the purposes of this section, the term 'region' will be used to encompass the Option 1 and Option 2 sites, along with the surrounding MDs, counties, towns, Indigenous reserves, and Métis settlements. The nearest central hub to this region is the City of Grande Prairie, which is approximately 200 km away from the Project site.

RAINBOW LAKE
HIGH LEVEL
Bushe River
Hay River
Boyer River
Dunlop River
Little Buffalo River
Basset Lake
Bede Creek
Bear River
MACKENZIE COUNTY
Haig River
Fontas River
Wabasca River
Caulfey Creek
Keg River
Mikkwa River
Wadlin Lake
Kemp River
Botha River
COUNTY OF NORTHERN LIGHTS
ALBERTA
Buffalo River
Chinchaga River
Meikle River
Hotchkiss River
Peace River
Wolverine River
Cache Creek
Bison Lake
Lafond Creek
Panny River
Sawn Lake
Haig Lake
Loon River
Doig River
Notikewin River
Osborn River
CLEAR HILLS COUNTY
Little Cadotte River
NORTHERN SUNRISE COUNTY
MUNICIPAL DISTRICT OF OPPORTUNITY NO. 17
Option 1 Project Location
Option 2 Project Location
Clear River
Whitemud River
Cadotte River
Eureka River
Cadotte Lake
Montagneuse River
Lubicon Lake
Lubicon River
Hines Creek
PEACE RIVER
Cardinal Lake
Heart River
MUNICIPAL DISTRICT OF PEACE NO. 135
FAIRVIEW
MUNICIPAL DISTRICT OF FAIRVIEW NO. 136
Utikuma River
Hamelin Creek
Ksituan River
Lac Magloire
Bearhead Creek
South Heart River
Utikuma Lake
Nipisi River
Nipisi Lake
SADDLE HILLS COUNTY
MUNICIPAL DISTRICT OF SPIRIT RIVER NO. 133
BIRCH HILLS COUNTY
Kimiwan Lake
MUNICIPAL DISTRICT OF SMOKY RIVER NO. 130
Pouce Coupé River
Saddle (Burnt) River
Little Smoky River
Winagami Lake
Bad Heart River
Peerless Lake
Lesser Slave Lake
MUNICIPAL DISTRICT OF LESSER SLAVE RIVER NO. 124
Beaverlodge River
SEXSMITH
BIG LAKES COUNTY
COUNTY OF GRANDE PRAIRIE NO. 1
Bear Lake
GRANDE PRAIRIE
Puskwaskau Lake
West Prairie River
East Prairie River
Driftpile River
Redwillow River
MUNICIPAL DISTRICT OF GREENVIEW NO. 16
Sturgeon Lake
Snipe Lake
Swan River
Wapiti River
Pelican Lake
Goose River

LEGEND

- HAMLET
- OPTION 1 PROJECT LOCATION
- OPTION 2 PROJECT LOCATION
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- INDIGENOUS RESERVE
- METIS SETTLEMENT
- MUNICIPAL DISTRICT BOUNDARY
- WATERBODY

0 25 50
1:1,250,000 KILOMETRES

NOTE(S)
1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
SOCIO-ECONOMIC REGIONAL CONTEXT

CONSULTANT
wsp

YYYY-MM-DD	2025-04-02
DESIGNED	MJ
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO. CONTROL: CA0038431.4096
REV.: 0
FIGURE: 5.6-1

5.6.1 Population

The region is undergoing a population decline and has an older demographic than the provincial average, with most municipalities having a higher proportion of residents aged 65 and older compared to the provincial average. In 2024, most municipalities report estimated populations of less than 5,000 people, with the exception of the Town of Peace River with a population of 7,102 (Statistics Canada 2022a). The change of region populations is shown in Table 5.6-1.

The majority of the municipalities experienced a population decline between 2019 and 2024, with decreases ranging from 0.9% (Northern Sunrise County) to 8.1% (Peace No. 135). This is in contrast to the 10.8% growth that occurred at the provincial level. Population growth occurred in the other four municipalities, ranging from 1.5% (Birch Hills County) to 8.0% (Falher). The Town of Peace River experienced 5.3% population growth during this period. The median age of the population for most of the municipalities are slightly older than the province (38.4 years), ranging from 38.8 years (Town of Grimshaw) to 44.4 years (Town of Fairview, MD of Smoky River No. 130, and Town of Falher) (Statistics Canada 2022a).

The MD of Clear Hills No. 21 and Town of Peace River are the only municipalities with a younger median age of 30.6 years and 35.6 years, respectively, compared to the provincial median age of 38.4 years. The older median ages are likely due to the larger proportion of the population aged 65 years and over (i.e., retirement age) in the majority of the region. Most municipalities have retirement populations that exceed the provincial average of 14.8%, with the exception of Clear Hills County and Town of Peace River (13.8% and 12.1%, respectively). People of working age (aged 15 to 64 years old) make up most of the population which varies from 55.6% (Clear Hills County) to 67.6% (Town of Peace River) within each municipality. The working age population of the municipalities is comparable to the provincial average of 66.2%.

Table 5.6-1: Region Population (2019-2024)

Municipality	Year						Change (2019 to 2023)	
	2019	2020	2021	2022	2023	2024	#	%
Birch Hills County	1,506	1,496	1,567	1,557	1,547	1,529	23	1.5
Clear Hills	3,222	3,198	3,100	3,080	3,084	3,086	-136	-4.2
Fairview No. 136	1,546	1,554	1,626	1,603	1,615	1,629	83	5.4
Falher	1,012	1,016	1,037	1,034	1,050	1,093	81	8.0
Grimshaw	2,678	2,618	2,687	2,652	2,598	2,646	-32	-1.2
Northern Lights County	4,405	4,331	4,248	4,156	4,104	4,080	-325	-7.4
Northern Sunrise County	1,836	1,798	1,764	1,765	1,827	1,820	-16	-0.9
Peace No. 135	1,710	1,711	1,620	1,603	1,580	1,572	-138	-8.1
Peace River	6,745	6,745	6,853	6,741	6,882	7,102	357	5.3
Smoky River No. 130	1,977	1,951	1,960	1,906	1,890	1,893	-84	-4.2

Source: GOA 2024e.

The majority of the municipalities in the region have a larger Indigenous population than the provincial average (6.8%). The Indigenous population ranges from 3.8% (MD of Smoky River No. 130) to 20.7% (County of Northern Lights), surpassing the provincial average of 6.8% (Statistics Canada 2022a). The Indigenous population in the region is predominantly Métis, followed by First Nations, and a small minority of Inuit in the County of Northern Lights (0.5%). The largest Métis population among the municipalities is found in the MD of Northern Lights No. 22 (16.1%) followed by the MD of Peace No. 135 (11.1%). The largest Indigenous population among the municipalities is found in town of Peace of River (8.8%).

5.6.2 Education

The region has five school districts (SD) – Peace River SD No. 10, Northland SD No. 61, Peace Wapiti SD No. 76, High Prairie SD No. 48, and the Conseil Scolaire du Nord-Ouest, which operate about 94 schools and centres for elementary and secondary school education. The Northwestern Polytechnic, a post-secondary institution, operates across campuses in the Town of Fairview and Grande Prairie. The institution offers programs for apprenticeship and pre-employment trades training, diploma and certificates, and university transfers (Northwestern Polytechnic 2025). Another educational institution close to the region is the Northern Lakes College in Grande Prairie, which offers programs for apprenticeship in carpentry, electrical, and welding (Northern Lakes College 2025). The closest institute to obtain a bachelor's degree or higher is the Athabasca University in which the main campus is in Athabasca, approximately 400 km away from Option 1 and Option 2 sites. Athabasca University offers courses online and through distance education, allowing flexibility for students to work in any location (GOA 2025b).

The region exhibits educational attainment levels that fall below the provincial averages. Across the region, a higher proportion of the population aged 15 and older lacks any form of certificate, diploma, or degree, with figures ranging from 19.9% (MD of Smoky River No. 130) to 49.6% (Clear Hill County), in contrast to the provincial average of 15.5% (Statistics Canada 2022a). High school is the most common level of highest education, varying from 27.5% (MD of Peace No. 135) to 37.3% (Birch Hills County), which is comparable to the provincial average of 28.8%.

Obtaining an apprenticeship or trades education is more common in the region, with higher levels of attainment than the provincial average (8.7%) in almost every municipality. The higher levels of apprenticeship attainment may have contributed to the workforce in the top industries in the region such as agriculture, resource extraction, and construction. College attainment is near or exceeds the provincial average in the majority of municipalities, with the exception of Clear Hills County, where attainment level for college is 10.1%.

All municipalities report lower attainment for bachelor's degree or higher education compared to the province (25.6%), varying from 3.8% (Clear Hills County) to 16.6% (Town of Peace River). The distance and access to educational institutions for college and university programs may have contributed to the lower levels of attainment for college and bachelor's degree or higher. In addition, the type of industry available in the region may not necessarily require a bachelor's degree or higher education.

When considering the provincial average for both men and women, the region still has lower educational attainment levels compared to the province. A larger proportion of men in the majority of the municipalities were without certificates, diplomas, or degrees, compared to women for the same metric (Statistics Canada 2022a). The Town of Peace River is the only municipality where a higher percentage of women lack certificates, diplomas, or degrees compared to men (21.2% and 20.5%, respectively). This is also seen at the provincial level (16.4% and 14.6%, respectively). Both men and women represent a higher percentage of the population without certificates, diplomas, or degrees compared to the province (16.4% and 14.6%, respectively).

Secondary education is the highest level of education for most of the region, but there are still differences between men and women. In over half of the municipalities, a higher percentage of women have obtained a high school education compared to men. Provincially, the rates for both men and women are 28.8%. Most municipalities exceed this provincial rate for either men or women, except for the County of Northern Lights (27.1% for men), MD of Peace No. 135 (23.3% for men), Clear Hills County (23.1% for men), Town of Fairview (28.5% for men) and Northern Sunrise County (27.9% for men and 27.8% for women), which fall below the provincial average.

Across the region, a higher percentage of men have completed apprenticeships compared to women. Men are more likely than women to achieve this level of education in the region, with differences ranging between two (Town of Falher) to over six times more men than women (MD of Clear Hills No. 21). For men, the percentages range from 13.1% (Clear Hills County) to 24.8% (MD of Peace No. 135). For women, the percentages range from 2.0% (Clear Hills County) to 7.4% (Town of Falher). This pattern is consistent with the provincial data, where 13.9% of men and 3.7% of women have completed apprenticeships as their highest level of education. The proportion of men achieving this metric is higher in almost every municipality than the provincial average (13.9%), with the exception of the Clear Hills County (13.1%). Trades education is less common for women in the region as the majority of municipalities have lower rates of women achieving this metric than the provincial average (3.7%).

Women have higher rates in college-level education (ranging from 14.1% [Clear Hills County] to 28.6% [Town of Grimshaw]) compared to men (ranging from 6.0% [Clear Hills County] to 17.1% [Northern Sunrise County and MD of Smoky River No. 130]). This pattern is reflected provincially as well (21.3% and 14.9%, respectively). The majority of men's college attainment level is below the provincial average, whereas women surpass the provincial average.

Similarly, women have higher rates of attaining a bachelor's degree or higher (ranging from 5.1% [Clear Hills County] to 18.9% [Town of Peace River]) compared to men (ranging from 2.0% [Clear Hills County] to 14.4% [Town of Peace River]). This trend is consistent with the province as there is a higher percentage of women compared to men with bachelor's degree or higher education (27.8% and 23.4%, respectively). The men and women in the region are less likely to pursue a bachelor's degree or higher-level education, with rates of attainment well below the provincial averages.

5.6.3 Health

Alberta is divided into seven regional health corridors and the municipalities are located within the Northwest corridor (GOA 2025a). Prior to November 2024, the region was organized as health care zones and the municipalities were located within the North Zone. The North Zone was further divided into Local Geographic Areas (LGA), in which the Project site fell within the Peace River LGA. Healthcare information is provided for the Peace River LGA for the 2020/2021 years as more recent information is not available. Community level health data for the Indigenous communities is not available as the data is only available at the provincial or national level.

The social determinants of health are the range of personal, social, economic, and environmental factors that determine individual and population health. The main determinants of health include income and social status; employment and working conditions; education and literacy; childhood experiences; physical environments; social supports and coping and skills; healthy behaviours; access to health services; biology and genetic endowment; gender; culture; and race/racism (GOC 2025). For Indigenous Peoples in Canada, the social determinants of health cause widespread negative effects on physical, mental, and community well-being (CAP Department of Research 2025). These determinants include federal policies that impose socio-economic disparities, intergenerational trauma from residential schools, modern colonialism that perpetuates disparities via child welfare and criminal justice systems, and structural determinants that shape health outcomes.

Health inequalities for Indigenous populations are also often underestimated due to a lack of disaggregated identity data collection. Data on health for Indigenous Peoples will be discussed in greater detail for the Impact Assessment. Data at the provincial level is provided for context, however not available publicly at the level of each Indigenous Nation or geographical region. Indigenous Peoples in Alberta are impacted more by cancers caused by infectious agents (viruses and bacteria) compared to non-Indigenous Peoples. These cancers include cervical, liver, and stomach (AFNIGC 2023). Life expectancy for Indigenous men and women in Alberta have fallen in recent years from 2015 to 2021, falling from 67 to 60 years for Indigenous men and 73 to 66 years for Indigenous women (APTN 2023). By 2023, the average life expectancy for Indigenous Albertans was 62.8 years, compared to 81.9 years for non-Indigenous Albertans. Contributors to this difference are the disproportionate effects of COVID-19 harms and opioid deaths on Indigenous

Albertans (Statistics Canada 2024a). The mortality rate was 4.5 times higher for Indigenous Peoples in Canada compared to the general population, and rates of unintentional opioid poisoning deaths are over eight times higher among Indigenous Albertans than non-Indigenous Albertans (AFNIGC 2024).

In 2020, hypertension was the most common chronic disease in the Peace River LGA, with a prevalence rate of 21.4 per 100 population, closely matching the provincial rate of 20.6 (GOA 2022). This was followed by diabetes (8.7), ischemic heart disease (4.9), and chronic obstructive pulmonary disease (4.0%), all of which had higher rates than the provincial rates of 8.3, 4.0, and 2.9, respectively. The Peace River LGA reported higher mortality rates per 100,000 population for all causes of death compared to the provincial average (973.8 vs. 700.3). The primary causes of death were neoplasms, diseases of the circulatory system, and external causes (injury), with rates of 260.9, 251.6, and 124.0, respectively, all exceeding the provincial rates of 178.2, 191.1, and 57.1. Between 2011 to 2020, the Peace River LGA reported a life expectancy of 78.0 years compared to provincial rate of 81.7 years.

5.6.4 Infrastructure and Services

5.6.4.1 Infrastructure

The Town of Manning, located in the County of Northern Lights, operates a Regional Water Treatment Plant with reservoirs to the west and north of the town (Town of Manning 2025a). Water is sourced from the Notikewin River, the River Pump House, West Reservoir, and North Reservoir. In 2017, the facility supplied a daily maximum of 2058 m^3 with an average of 1165 m^3 of water for treatment. Additionally, the Town of Manning has a wastewater collection and treatment system handling 2261 m^3 of sewage daily, with a 68,440 m^3 retention capacity over 30 days. The MD of Peace No. 135 encompasses five water cooperatives: Shaftesbury Water Co-op (connected to Peace River's supply), Weberville Water Co-op, East Grimshaw Water Co-op, West Grimshaw Water Co-op, and Griffin Creek Water (MD of Peace River 2025a). Other regions, such as the MD of Fairview, Birch Hills County, Northern Sunrise County, and MD of Smoky River No. 130, also provide water and sewer services to their own jurisdictions (MD of Fairview 2025; Birch Hills County 2025; Northern Sunrise County 2025a; MD of Smoky River 2025).

5.6.4.2 Health Services

The region has five health facilities located in the Town of Peace River, Town of Grimshaw, Town of McLennan in MD of Smoky River No. 130, Town of Fairview, and Town of Manning in the County of Northern Lights (AHS 2025a). These facilities provide Community Health Services, Emergency Departments, Hospitals, Primary Care Networks, Addiction and Mental Health Services, and Continuing Care. The Town of Peace River offers all these services and is the only facility in the region with a Cancer Care Centre. Grande Prairie also has similar health facilities providing the same services.

Services specific to Indigenous Peoples are offered through Indigenous Wellness Core programs in the Town of Peace River and Town of McLennan (AHS 2025b). Indigenous Wellness Core program partners with Indigenous Peoples and communities in providing accessible and culturally appropriate services for First Nations, Métis, and Inuit Peoples. The program aims to support cultural awareness and sensitivity, helps patient navigate through the healthcare system, provides referrals to addiction and mental health supports, and monitors the health of the Indigenous population in northern Alberta. In addition, the program can support Indigenous patients and families throughout their hospital stay, connect to health services and programs in their home communities, and work with communities to create partnerships in aspects of public health and chronic disease management.

Information gathered was taken from Indigenous communities' website and publicly available information found in August 2024. The following communities have health centres within their communities: Woodland Cree First Nation (WCFN 2024), Whitefish Lake First Nation (WLFN 2024), Driftpile Cree Nation (DCN 2024), Kapawe'no First Nation (KFN 2024), Swan River First Nation (SRFN 2024), Sturgeon Lake Cree Nation (SLFN 2024), and Horse Lake First Nation (AHS 2023). Peavine Métis and Gift Lake Métis offer Indigenous Wellness Core programs in their communities in collaboration with Alberta Health Services (AHS 2025b). Some information about health centres in Duncan First Nation, Lubicon Lake First Nation, Loon River First Nation, and Sucker Creek First Nation is available publicly, but it is unclear whether these centres are still operational (Inform Alberta 2024). There is no information available for any health centres within the Sawridge First Nation.

Health centres in Indigenous communities may offer health counselling, education, and treatment (Inform Alberta 2024). Depending on the community, there are different services available which may include promotion of healthy living, illness prevention, immunization, hearing and vision assessment, caring for seniors, home visits for postnatal surgery, counselling and treatment for sexually transmitted infections, referrals to other health professionals, pregnancy testing and birth control counselling, as well as offering health education programs in schools.

5.6.4.3 Emergency and Protective Services

The County of Northern Lights has a regional fire hall located in the Town of Manning. The service area reaches from the Town of Manning to north to the Keg River, east to the Peace River, west to the British Columbia and Alberta border, and south to Dixonville (Town of Manning 2025b). The fire coverage area is about 2,800 km^2 while the rescue coverage area is about 19,000 km^2. The MD of Peace River No. 135 has fire halls and equipment in hamlets of Brownvale, Berwyn, and Strong Creek (MD of Peace River 2025b).

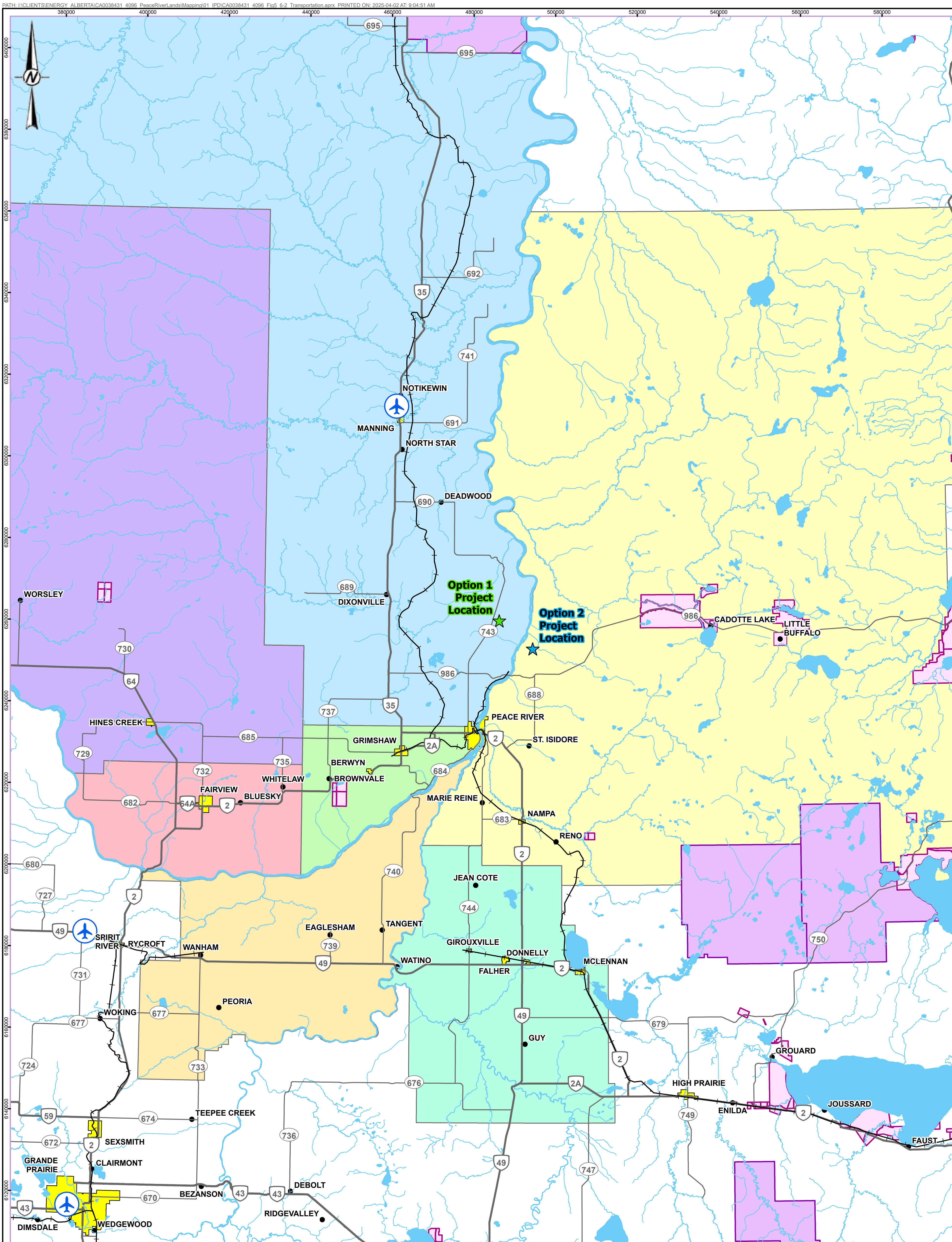
The County of Northern Lights and Town Manning has also established a Municipal Emergency Management Agency and Disaster Services Joint Agency. Both agencies develop and execute municipal programs to prepare and respond to emergencies and disasters (Town of Manning 2025b). Clear Hills County partners with Alberta Health Services for Emergency Medical Services (EMS). EMS provides ambulance services in the Clear Hills County and its surrounding areas, reaching up to the border of Alberta and British Columbia, Dunvegan River, and to the edge of MD of Fairview, Worsley and Cleardale (Clear Hills County 2025).

Police services are operated by Royal Canadian Mounted Police (RCMP) in the region (Town of Manning 2025b; MD of Peace River 2025b; Clear Hills County 2025).

5.6.4.4 Transportation

The County of Northern Lights, the MD of Peace No. 135, and the Town of Peace River are connected to outlying communities by a series of provincial highways(Figure 5.6-2). Highway 35 runs north-south in through the County of Northern Lights and the Town of Manning to the Town of Grimshaw in the MD of Peace No. 135. East of Grimshaw, Highway 2A leads to the Town of Peace River, the largest centre in the region. In Northern Sunrise County, Highway 2 runs north-south from the Town of Peace River to the MD of Smoky River No. 130, where it becomes Highway 49. Highway 2, west of Grimshaw, leads west into the Town of Fairview in MD No. 136, where it ties into Highway 64, which then runs north and west in the Clear Hills County. Access to Birch Hills County is primarily by Highway 49 and Secondary Highway 740. Canadian National (CN) Railway also connects the region through railways and stations in the Town of Falher, Town of Peace River, and Town of Manning, which further connect to the northern and southern areas of the region (CN 2025). Access to the Project site is provided from Highway 743, which runs north-south, immediately west of the Town of Peace River.

The County of Northern Lights owns and operates its airport (Manning Municipal Airport), located north of the Town of Manning. The presence of a modern air terminal provides an efficient service for passenger flights. The airport underwent a redevelopment in 2006, adding three new aircraft taxiways and an asphalt section that optimized the area for parking of smaller aircraft and facilitating aircraft movement (County of Northern Lights 2025). Additionally, the region has the Spirit River Airport, primarily used for medical services, dusting applications, and general aviation activities (Spirit River 2025). Furthermore, the Grande Prairie Airport offers direct flights to Calgary and Edmonton (Grande Prairie Airport 2024).



LEGEND

- AIRPORT
- HAMLET
- OPTION 1 PROJECT LOCATION
- OPTION 2 PROJECT LOCATION
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- RAILROAD
- WATERCOURSE
- INDIGENOUS RESERVE
- METIS SETTLEMENT
- POPULATED PLACE
- WATERBODY

MUNICIPAL DISTRICT BOUNDARY

- BIRCH HILLS COUNTY
- CLEAR HILLS COUNTY
- COUNTY OF NORTHERN LIGHTS
- MUNICIPAL DISTRICT OF FAIRVIEW NO. 136
- MUNICIPAL DISTRICT OF PEACE NO. 135
- MUNICIPAL DISTRICT OF SMOKY RIVER NO. 130
- NORTHERN SUNRISE COUNTY

0 20 40

1:900,000 KILOMETRES

NOTE(S)

1. PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

REFERENCE(S)

CLIENT
ENERGY ALBERTA

PROJECT
PEACE RIVER NUCLEAR POWER PROJECT

TITLE
TRANSPORTATION OF PROJECT SITE

CONSULTANT

YYYY-MM-DD	2025-04-02
DESIGNED	MS
PREPARED	KW
REVIEWED	CB
APPROVED	MM

PROJECT NO.	CONTROL	REV.	FIGURE
CA0038431.4096		0	5.6-2

5.6.5 Economy

Agriculture, forestry, hunting, and fishing make up the majority of the economic base of the region, well above the provincial average (2.8%) (Statistics Canada 2022a). In addition, the region has several well-developed secondary industry bases, contributing uniquely to the overall economy. For instance, the economy of County of Northern Lights is driven by industries such as forestry, agriculture, oil and gas, and resource extraction. The county hosts a lumber mill, oil and gas plants, a pulp mill, transportation services, oilfield services, and industrial storage facilities. It is a contributor to the industry, generating over $27 billion annually and accounting for 36% of Alberta's natural gas production and 50% of its crude oil production (County of Northern Lights 2024).

Agriculture is also the main economic base in MD of Peace No. 135. Its total farmland is 92,488 ha of which most area is used for grain farming, mixed farming, game farming, cattle farming, and beekeeping. There is also an expanding volume of oil and gas activity in the area (MD of Peace River 2025b).

Northern Sunrise County's economy is similarly based on oil and gas, forestry, agriculture, and tourism (Northern Sunrise County 2025b). The county is home to the Peace Oil Sands, one of Alberta's four major deposits, containing 130 billion barrels of bitumen. Forestry is a key industry, with active forest management practices in place to maintain healthy forest regeneration. The county has four forest management agreements and thousands of acres of timber, attracting businesses like Boucher Bros. Ltd sawmills and other logging and service companies. Additionally, Northern Sunrise County boasts over 21,000 km^2 of agricultural land, a grain terminal with a capacity of 44.5 metric tons, and direct access to the CN Railway. Tourism is also promoted, with nearly 24 hours of daylight during the summer months, ideal for camping, fishing, wildlife watching, and other outdoor activities.

The MD of Smoky River No. 130 and the Town of Falher are two of the five members of the Smoky River Region. The Smoky River Regional Economic Development's key industries include agriculture, apiculture, and transportation services. In 2016, the MD of Smoky River No. 130 had 289 farm families cultivating a total of 545,973 acres (Smoky River Regional Economic Development 2024). Due to the extensive farmable land, the region hosts the Smoky Applied Research Development Association, which conducts research and provides recommendations to promote sustainable agricultural production. Apiculture is another prevalent economic base in the Smoky River Region with 3.75 million pounds of honey produced each year. Additionally, the highways intersecting the Smoky River Region offer routes to major provincial centres, and the presence of the CN Railway yard depot enhances the region's transportation capabilities.

Clear Hills County also has agriculture and oil and gas as their economic base (GOA 2024g). Similarly, agriculture is a key industry in other municipalities like the MD of Fairview No. 136, Clear Hills County, and Birch Hills County. This is evidenced by their establishment of Agricultural Service Boards, which aim to support and strengthen the local agricultural sector.

5.6.6 Labour Force

Reflecting the region's diverse labour force in 2021, the industries of agriculture, forestry, fishing, and hunting employed a prominent portion of the workforce across most municipalities, ranging from 3.3% (Town of Grimshaw) to 50.0% (Birch Hills County), which is above the provincial average of 2.8% (Statistics Canada 2022a). The Town of Peace River was an exception, reporting a slightly lower employment rate in the agricultural, forestry, fishing, and hunting industries at 2.6%. The health care and social assistance industry emerged as the next largest employer, employing between 3.6% (Birch Hills County) and 17.3% (Town of Fairview) of the populations within their municipalities. The third largest industry is the retail trade industry, which accounted for employment rates ranging from 3.2% (MD of Smokey River No. 130) to 15.9% (Town of Peace River). The construction industry is also prominent, which accounted for 4.3% (Town of Falher) to 13.8% (Town of Grimshaw) of total employment across all municipalities.

In 2021, the labour force from the municipalities ranged from 475 to 3,690. The participation rates in the municipalities ranges from 57.0% (Birch Hills County) to 72.7% (MD of Smoky River No. 130). The majority of the region has participation rates below the provincial participation rate range of 68.0% (Statistics Canada 2022a). Similarly, the employment rate in the municipalities ranges from 56.0% (Birch Hills County) to 68% (MD of Smoky River No. 130), with Alberta around the middle range of 60.2%. The unemployment rates are close, if not, lower in the majority of the municipalities compared to the provincial unemployment rate of 11.5% in 2021. By 2023, the provincial rate had settled to 5.9% (Statistics Canada 2024b)[3].

Men had higher participation in the labour force compared to women. The participation rate is higher for men (61.1% [Birch Hills County] to 79.9% [Clear Hills County] compared to women in most of the region except the Town of Falher (64.9% for men and 67.6% for women) (Statistics Canada 2022a). In more than half of the region, men's participation rates fall below the provincial average (72.6%). This pattern is similar with women, where most of the region fall below the provincial average (63.5%). The unemployment rate is lower for men (0.0% [Birch Hills County] to 14.7% [Clear Hills County]) compared to women (0.0% [Birch Hills County] to 11.6% [MD of Peace No. 135]) in most of the region, with the exception of Northern Sunrise County (7.6% for men and 4.1% for women), Town of Peace River (8.1% for men and 7.5% for women), and Town of Falher (12.5% for men and 10.9% for women). In most of the region, men's unemployment rates are below the provincial average (11.4%), except the Town of Grimshaw (14.7%) and Town of Falher (12.5%). In contrast, with women, all municipalities have lower unemployment rates than the provincial average in 2021 (11.7%). In 2023, the provincial unemployment rates have dropped to 6.0% for men and 5.8% for women (Statistics Canada 2024b)[4]. In 2020, the median income and average income in the majority of municipalities was below the provincial median ($41,600) and average ($60,850) (Statistics Canada 2022a).

[3] The 2023 unemployment rates for the municipalities in the region are not publicly available but will be updated in the EA.

[4] The 2023 unemployment rates for the municipalities in the region are not publicly available but will be updated in the EA.

The Town of Grimshaw and Town of Peace River have only slightly higher median income ($45,200 and $43,600, respectively) than the provincial median income ($41,600), while the rest of the municipalities have lower median incomes. The Northern Sunrise County reports the highest average income with $63,100, slightly higher than the provincial average of $60,850, whereas the Town of Peace River matched the provincial average. The economy of Northern Sunrise County is built by the province's strongest economic drivers: oil and gas, forestry, agriculture, and tourism (Northern Sunrise County 2025b). This economic foundation likely contributes to Northern Sunrise County having the highest average income, surpassing the provincial average. The average incomes in the other municipalities were lower, between $53,300 (County of Northern Lights and MD of Peace No. 135) and $57,200 (MD of Smoky River No. 130).

In 2020, men earned more than women, but both genders had incomes below the provincial average (Statistics Canada 2022a). In most of the region, men have lower median employment income ($27,600 [Clear Hills County] to $50,000 [Town of Fairview]) compared to the province ($51,600), with exception of Town of Grimshaw (($63,600), Town of Peace River ($59,200) and Town of Falher ($53,600). The median income of women ($14,500 [Clear Hills County] to $32,800 [Town of Peace River]) in all of the region falls behind the provincial average ($33,600). For all of the regions, men have higher median income compared to women. Men also have lower average income ($45,800 [Clear Hills County] to $67,000 [MD of Smoky River No. 130]) compared to the provincial average ($72,700), with exception of Northern Sunrise County ($76,600) and Town of Peace River ($73,000). The average income of women ($29,950 [Clear Hills County] to $48,400 [Town of Peace River]) also falls behind the provincial average ($49,160). For all of the regions, men have higher average income compared to women.

6 PART E – FEDERAL, PROVINCIAL, TERRITORIAL, AND MUNICIPAL INVOLVEMENT AND EFFECTS

6.1 Federal Funding

The Project is currently receiving funding from the Government of Canada through the Natural Resources Canada (NRCan) Electricity Pre-Development Program. This program is expected to continue to provide funding during the pre-development phase of work for the Project. There is potential for future federal funding, but this has not been confirmed at this time.

6.2 Federal Lands

The Project will be constructed on lands owned by Energy Alberta. There will be no federal lands used for the purpose of carrying out the Project.

6.3 Federal, Provincial, and Municipal Jurisdictional Requirements

A number of agencies and regulators potentially have powers, duties, or functions in relation to the assessment of the Project's potential environmental impacts. Specific legislation and regulations are listed, as applicable. Energy Alberta will confirm any approval requirements with these agencies and regulators in the future.

6.3.1 Federal Requirements

Under the *Nuclear Safety and Control Act*, nuclear power facilities are federally regulated by the CNSC requiring each phase of the facility's lifecycle to be licensed. In accordance with the IAA, the construction and operation of a Class IA nuclear facility, as well as facilities for the storage and disposal of nuclear waste, constitutes a "designated project" as described in subsection 27(b) of the Physical Activities Regulations". The CNSC and IAAC will collaborate in completing and Impact Assessment. The following outline the federal legislation and regulations known to have applicability to the Project.

- CNSC
  - *Nuclear Safety and Control Act*
  - General Nuclear Safety and Control Regulations
  - Nuclear Non-Proliferation Import and Export Control Regulations
  - Safeguards Regulations
  - Radiation Protection Regulations
  - Class I Nuclear Facilities Regulations
  - Packaging and Transport of Nuclear Substances Regulations, 2015

- Nuclear Security Regulations
- Canadian Nuclear Safety Commission Cost Recovery Fees Regulations
- Canadian Nuclear Safety Commission Rules of Procedures (GOC 2000b)
- Canadian Nuclear Safety Commission By-Laws (GOC 2000a)

- Impact Assessment Agency of Canada
  - *Impact Assessment Act*
- Other federal agencies legislation and regulations
  - Fisheries and Oceans Canada
    - *Fisheries Act*
  - Environment and Climate Change Canada
    - *Strategic Assessment of Climate Change (ECCC 2020a)*
    - *Canadian Environmental Protection Act*
    - *Species at Risk Act*
    - *Migratory Birds Convention Act, 1994*
    - *Migratory Birds Regulations*
  - Indigenous Services Canada
  - Women and Gender Equality Canada
  - Natural Resource Canada
    - *Explosives Act (to be determined)*
  - Health Canada
  - Transportation Canada
    - *Aeronautics Act*
    - *Canadian Navigable Waters Act*

6.3.2 Provincial and Local Government Requirements

The need for Environmental Assessments (EAs) in Alberta is determined by Alberta's *Environmental Protection and Enhancement Act*. The EA (Mandatory and Exempted Activities) Regulation defines which activities are mandatory (Schedule 1) and will require an EA report, or which activities are excluded (Schedule 2) and do not require one. According to the EA (Mandatory and Exempted Activities) Regulation, the Project is listed as 'mandatory' under item (k) in Schedule 1 and will require an EA report. More specifically, Schedule 1 provides:

> "*The construction, operation or reclamation of…*
>
> *(*k) a thermal electrical power generating plant that uses non-gaseous fuel and has a capacity of 100 megawatts or greater;"

The following provincial agencies and regulators potentially have powers, duties, or functions in relation to the assessment of the Project's potential environmental effects. Specific legislation and regulations are listed, as applicable. Energy Alberta will confirm any approval requirements with these agencies and regulators in the future.

- Alberta Environment and Protected Areas
  - *Environmental Protection and Enhancement Act*
  - *Water Act*
  - Alberta Wetland Policy (GOA 2013)
  - *Wildlife Act*
  - *Fisheries (Alberta) Act*
  - *Weed Control Act*
  - *Weed Control Act Regulation*
  - *Public Lands Act*
  - Environmental Assessment (Mandatory and Exempted Activities) Regulation
  - Activities Designation Regulation
- Alberta Arts, Culture and Status of Women
  - *Historical Resources Act*
- Alberta Utilities Commission
  - *Hydro and Electric Energy Act*
- Alberta Aboriginal Consultation Office

- Alberta Transportation and Economic Corridors
- Alberta Emergency and Disaster Planning
  - *Emergency Management Act*
- Alberta Jobs, Economy and Trade
  - *Occupational Health and Safety Act*
  - Occupational Health and Safety Regulation
  - Occupational Health and Safety Code (GOA 2024f)

There are currently no known impact assessment requirements for local governments.

7 PART F – POTENTIAL EFFECTS OF THE PROJECT

The objectives of this section are to present a summary of the potential key environmental areas of concern, and to link these to the pathways through which Project components and activities can potentially impact the environment (i.e., biophysical and socio-economics), including:

- effects related to federal legislation
- potential changes to the environmental on lands outside of Alberta and Canada
- potential impacts to Indigenous communities
- potential impacts to Indigenous community health, social and economics
- potential impact to other components of the biophysical and social environment

7.1 Approach to Determining Potential Effects

The Project has the potential to interact and affect the biophysical and socio-economic environments of the region. For an interaction to occur there must be a source (i.e., a Project component, works, or activity) that interacts with biophysical and socio-economic environments (Figure 7.1-1).

Figure 7.1-1: Project-Environment Interactions

The preliminary screening was conducted by reviewing the potential interactions and identifying areas with the potential for concern. This was completed by constructing a Project environment interactions matrix that identified potential interactions among key Project facilities/activities and environmental components (i.e., atmospheric, geological, hydrogeological, surface water, terrestrial, and socio-economic environments, as well as land and resource use) for each planning envelope. Table 7.1-1 provides a preliminary summary of the potential interactions and the pathway for effects with the biophysical and socio-economic environments. The components that are not marked with ✔ in the table are not expected to have an interaction with a key Project components and/or activity.

These interactions are used to guide the design of scientifically robust baseline programs to describe the existing environment and studies to assess environmental impacts. The list of interactions provided is based on current Project information and design detail and it is expected that the interactions and level of detail will evolve during the Project design, engagement and Impact Assessment processes.

Table 7.1-1: Potential Interactions between the Project and the Biophysical and Socio-Economic Environment

Project Phase	Key Project Component/Activity(a)	Atmospheric Environment				Geological and Hydrogeological Environment		Aquatic Environment			Terrestrial Environment				Ambient Radioactivity		Social Environment				
		Air Quality	Climate	Noise	Visual Aesthetics	Geology	Hydrogeology	Hydrology	Surface Water Quality	Fish and Fish Habitat	Terrain and Soils	Vegetation, Riparian and Wetlands	Birds and Migratory Birds	Wildlife and Wildlife Habitat	Human Health	Ecological Health	Cultural and Heritage Resources	Indigenous Land and Resource Use	Other Land and Resource Use	Economy	Community Well-being
Site Preparation and Construction	Land clearing, site preparation, and construction of facilities and infrastructure,	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
	Site traffic, transportation of personnel and materials to and from the site	✓	✓	✓					✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Construction of buildings and infrastructure, including piles and foundations	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Installation of services and utilities onsite	✓	✓	✓					✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Management and storage of conventional, hazardous and low-level radioactive waste	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	Onsite fabrication of concrete, structural steel, piping, tubing, and conduits, and supporting components	✓	✓	✓					✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Operation of site preparation and construction equipment	✓	✓	✓					✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Excavations, horizontal and/or vertical tunnelling for the reactor building	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
	Onsite and offsite road development or improvements	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
	Water intake and discharge infrastructure							✓	✓	✓		✓	✓	✓			✓	✓	✓		✓
	Installation of turbine generators	✓	✓	✓	✓						✓	✓	✓	✓				✓	✓	✓	✓
	Construction and operation of water management systems	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Installation of security infrastructure	✓	✓	✓							✓	✓	✓	✓				✓	✓	✓	✓

Table 7.1-1: Potential Interactions between the Project and the Biophysical and Socio-Economic Environment

Project Phase	Key Project Component/Activity(a)	Atmospheric Environment				Geological and Hydrogeological Environment		Aquatic Environment			Terrestrial Environment				Ambient Radioactivity		Social Environment				
		Air Quality	Climate	Noise	Visual Aesthetics	Geology	Hydrogeology	Hydrology	Surface Water Quality	Fish and Fish Habitat	Terrain and Soils	Vegetation, Riparian and Wetlands	Birds and Migratory Birds	Wildlife and Wildlife Habitat	Human Health	Ecological Health	Cultural and Heritage Resources	Indigenous Land and Resource Use	Other Land and Resource Use	Economy	Community Well-being
Operations	Site traffic, transportation of personnel and materials to and from the site	✓	✓	✓					✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Nuclear commissioning and reactor operation	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Management of conventional, hazardous and nuclear waste	✓							✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	Operation of water management systems (e.g., ditches, storm ponds, drainages)							✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Operation of cooling system infrastructure	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Water treatment and discharge	✓	✓					✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Power generation, including diesel generators and turbines	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓				✓	✓		✓
	Additional infrastructure (e.g., roads, maintenance shops, offices)	✓	✓	✓	✓					✓	✓	✓	✓					✓	✓	✓	✓
	Progressive reclamation	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
Decommissioning	Site traffic, transportation of personnel and materials to and from the site	✓	✓	✓					✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Decommissioning and demolition of site infrastructure	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Storage of radioactive waste	✓							✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	Transport of radioactive waste to long-term storage/disposal site	✓	✓	✓									✓	✓				✓	✓	✓	✓
	Reclamation and remediation of the site	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓

Notes:
(a) = Project components/activities do not include implementation of environmental design features and/or mitigation measures

✓ = interaction is anticipated (i.e., negative or positive interaction) prior to the implementation of environmental design features and/or mitigation measures; blank = no interaction is anticipated.

7.2 Changes Related to Federal Legislation

The following sections consider changes that, as a result of the Project, may be caused to:

- fish and fish habitat, as defined in subsection 2(1) of the *Fisheries Act*;
- aquatic species, as defined in subsection 2(1) of SARA (marine plants); and
- migratory birds, as defined in subsection 2(1) of the MBCA.

The following provides examples of anticipated interactions and mitigation measures. This list of interactions will be expanded upon through engagement with Indigenous Nations and Communities, the public, and regulators. Environmental design features and mitigation will also require input from Indigenous Nations and Communities, the public, and regulators. The Impact Statement will provide a comprehensive assessment of the potential changes with implementation of environmental design features and mitigations, and monitoring programs to validate the impact assessment predictions.

7.2.1 Fish and Fish Habitat and Aquatic Species at Risk

Fisheries and Oceans Canada (DFO) is responsible for issuing an Authorization under Section 35(2) of the *Fisheries Act* and Species at Risk Permit as defined in subsection 2(1) of SARA, if required. The *Fisheries Act* provides legal protection of fish and fish habitat in Canada. Section 34.4(1) of the *Fisheries Act* prohibits causing the death of fish by means other than fishing and Section 35(1) states that no person shall carry on any work, undertaking, or activity that results in harmful alteration, disruption, or destruction (HADD) of fish habitat. Any Project work below the high-water mark of a water body that has the potential to cause the death of fish (other than fishing) and/or results in the HADD of fish habitat that does not fall under the DFO codes of practice requires review by DFO.

Subject to certain exceptions, Section 36(3) of the federal *Fisheries Act* prohibits any person from depositing or permitting the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance may enter such water. Section 38(6) imposes a duty to minimize any adverse effects that result, or may reasonably be expected to result, from the unlawful deposit of a deleterious substance. Under Section 38(5) every person shall notify an inspector of the unlawful deposit of a deleterious substance, without delay. Any death of fish or HADD must be authorized by DFO to avoid the contravention of Sections 34.4(1) and 35(1) of the federal *Fisheries Act*. Section 34.3(4) of the federal *Fisheries Act* prohibits a person from obstructing free passage of fish.

Review of the DFO Aquatic Species at Risk Map (DFO 2024) did not identify any species at risk or critical habitat in the vicinity of the Project in either Option 1 or Option 2. The unnamed watercourse overlapped by the Project in Option 2 is not considered within the potential range or critical habitat for any federally listed species. The Project is not anticipated to impact aquatic species at risk. The Peace River in the vicinity of the Project is also not considered within the potential range or critical habitat for federally listed species and there is low risk of a species with an Endangered or Threatened designation under SARA to occur within the vicinity of the Project (DFO 2024). Therefore, it is not expected that a permit under SARA will be required to conduct Project activities within the Peace River that could affect an aquatic species at risk.

As part of the conservative approach taken in the Impact Assessment, potential changes are considered prior to mitigation. For this Project is expected that best practices and standard mitigation will prevent changes or reduce the risk of impacts to fish habitat. Examples of potential changes and associated mitigations related to Fish and Fish Habitat and Aquatic Species at Risk are provided in Table 7.2-1.

Table 7.2-1: Potential Changes to Fish and Fish Habitat and Aquatic Species at Risk

Project Phase	Potential Change to the Environment Prior to Mitigation	Standard Mitigation Examples
Site Preparation	■ Land activities may alter stream channels and riparian zones, disrupting fish spawning habitat and habitat connectivity. ■ Land clearing may result in alteration and/or loss of fish habitat from changes to water and sediment quality due to site water run-off and increased erosion. ■ Land clearing may disrupt natural drainage patterns resulting in changes to fish habitat due to decreased flow rates in the Peace River. ■ Operation of site preparation equipment may result in alteration and/or loss of fish habitat from changes to water and sediment quality due to site water run-off and increased erosion. ■ Site traffic and transportation of personnel and materials to site may result in alteration and/or loss of fish habitat from changes to water and sediment quality due to site water run-off and increased erosion. ■ Improper management and storage of conventional and hazardous waste may result in alteration of fish habitat and/or fish mortality due to changes to water and sediment quality.	■ Implement water management systems to control/divert/collect on-site water. ■ To the extent practical, work in sensitive areas (i.e., erosive soils, wetland features, and fish habitats) would be scheduled to avoid periods that may result in high flow volumes and/or increase erosion and sedimentation (e.g., spring freshet). ■ Implement dust suppression techniques such as watering of roads during dry and windy conditions. ■ Conventional and hazardous waste would be managed, stored and disposed of according to federal and provincial regulations.

Table 7.2-1: Potential Changes to Fish and Fish Habitat and Aquatic Species at Risk

Project Phase	Potential Change to the Environment Prior to Mitigation	Standard Mitigation Examples
Construction	■ Construction activities may alter stream channels and riparian zones, disrupting fish spawning habitat and habitat connectivity. ■ Construction activities and road development may disrupt natural drainage patterns resulting in changes to fish habitat due to decreased flow rates in the Peace River. ■ Installation of the water intake infrastructure may result in a loss of fish habitat and/or cause fish mortality. ■ Installation of the water pipeline may result in changes to the stability of the shoreline. ■ Site water run-off and erosion may result in alteration and/or loss of fish habitat from changes to water and sediment quality. ■ Water required for construction may result in changes to fish habitat due to decreased flow and water levels in the Peace River. ■ Site traffic and transportation of personnel and materials to site may result in alteration and/or loss of fish habitat from changes to water and sediment quality due to dust deposition. ■ Construction of buildings and infrastructure, and installation of services and utilities onsite may result in alterations to fish habitat from changes in surface water and sediment quality due to dust deposition. ■ Construction activities such as blasting may result in temporary sensory effects (i.e., noise) and mortality to fish (i.e., vibration). ■ Improper management and storage of conventional and hazardous waste may result in alteration of fish habitat and/or fish mortality due to changes to water and sediment quality.	■ To the extent practical, construct work areas to avoid critical or sensitive habitat (e.g., riparian zones) following best practices and regulatory requirements. ■ Implement DFO's Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2019b) to minimize potential effects on aquatic resources. ■ Erosion and sediment control measures would be installed, inspected and properly maintenance. ■ Implement water management systems to control/divert/collect on-site water. ■ Water intakes or pumps will be appropriately designed and installed to prevent entrainment or impingement of fish. ■ Implement dust suppression techniques such as watering of roads during dry and windy conditions. ■ Limit vehicle speed on unpaved site roads to reduce fugitive dust. ■ Follow DFO's Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters for setback distances. ■ Conventional and hazardous waste would be managed, stored and disposed of according to federal and provincial regulations.

Table 7.2-1: Potential Changes to Fish and Fish Habitat and Aquatic Species at Risk

Project Phase	Potential Change to the Environment Prior to Mitigation	Standard Mitigation Examples
Operations	■ Site water run-off and erosion may result in alteration and/or loss of fish habitat from changes to water and sediment quality. ■ The operation of water treatment facilities and the management of wastewater and site water runoff can influence hydrological processes, including water quantity and flow dynamics, and therefore, affect fish and fish habitat. ■ Water required for operations (e.g., mechanical draft cooling) may result in changes to fish habitat due to decreased flow and water levels in the Peace River. ■ Changes in water temperature and quality resulting from the operation of the nuclear facility can impact habitat quality and fish health. ■ Site traffic and transportation of personnel and materials to site may result in alteration and/or loss of fish habitat from changes to water and sediment quality due to dust deposition. ■ Improper management and storage of conventional and hazardous waste may result in alteration of fish habitat and/or fish mortality due to changes to water and sediment quality.	■ Erosion and sediment control measures would be installed, inspected and properly maintenance. ■ Recycle and reuse process water to reduce freshwater intake from the Peace River to the extent practical. ■ Maintain site drainage and water containment and conveyance structures on site. ■ Wastewater will be treated and tested before being discharged to the environment. ■ Implement progressive reclamation and revegetation of disturbed areas no longer required. ■ Implement dust suppression techniques such as watering of roads during dry and windy conditions. ■ Conventional and hazardous waste would be managed, stored and disposed of according to federal and provincial regulations.
Decommissioning	■ Operation of equipment may result in alteration and/or loss of fish habitat from changes to water and sediment quality due to site water run-off and increased erosion.	■ Develop and implement a Preliminary Decommissioning Plan. ■ All construction/demolition materials will be removed from the site once work is complete. ■ Disturbed areas will be reclaimed and revegetated. ■ Post-closure inspections and monitoring will be completed.

7.2.2 Migratory Birds

The MBCA protects migratory birds by protecting their nests and individuals of the species. The MBCA applies to most migratory birds. Birds that are not protected under the MBCA are grouse, quail, pheasants, ptarmigan, hawks, owls, eagles, falcons, cormorants, pelicans, crows, common raven (*Corvus corax*), jays, kingfishers, and some species of blackbirds.

The 2022 update to the Migratory Birds Regulations under the MBCA protect the active and inactive nests of 18 species, including pileated woodpecker (*Dryocopus pileatus*). Pileated woodpecker roosting and feeding cavities are not protected under the updated Migratory Birds Regulations. Pileated woodpecker nests require registration through ECCC's Abandoned Nest Registry (GOC 2022a) and confirmation of non-occupancy by any migratory bird over 36 months prior to removal of the tree containing the nest cavity (GOC 2022b).

As part of the conservative approach taken in the Impact Assessment, potential changes are considered prior to mitigation. For this Project is expected that best practices and standard mitigation will prevent changes or reduce the risk of impacts to migratory birds. Examples of potential impacts, and associated mitigations, related to migratory birds is provided in Table 7.2-2.

Table 7.2-2: Potential Changes to Migratory Birds

Project Phase	Potential Change to the Environment Prior to Mitigation	Standard Mitigation Examples
Site Preparation	■ Land clearing may result in loss and/or alteration of soils and vegetation, which can affect the abundance of migratory bird habitat. ■ Vegetation removal may result in the destruction of nests, eggs, and individual migratory birds. ■ Operation of site preparation equipment may result in sensory disturbance (e.g., presence of people, air traffic, lights, dust, smells, noise), which can affect the quality of migratory bird habitat. ■ Site water run-off and erosion may result in changes to the quality of migratory bird habitat. ■ Improper management and storage of conventional and hazardous waste may result in changes to the quality of migratory bird habitat and/or mortality.	■ Optimize the use of cleared areas for Project activity and use existing infrastructure (e.g., roads), where practical. ■ Avoid restricted activity periods, to the extent practical, to limit effects on nesting migratory birds during sensitive time periods. If sensitive periods cannot be avoided, pre-clearing wildlife sweeps will be completed. ■ Implement water management systems to control/divert/collect on-site water. ■ To the extent practical, work in sensitive areas (e.g., erosive soils, wetland features) would be scheduled to avoid periods that may result in high flow volumes and/or increase erosion and sedimentation (e.g., spring freshet). ■ Implement dust suppression techniques such as watering of roads during dry and windy conditions. ■ Conventional and hazardous waste would be managed, stored and disposed of according to federal and provincial regulations.
Construction	■ Installation of the water intake infrastructure may result in changes to migratory bird habitat. ■ Water required for construction may result in changes to migratory bird habitat due to decreased flow and water levels in the Peace River. ■ Operation of construction equipment may result in sensory disturbance (e.g., presence of people, air traffic, lights, dust, smells, noise), which can affect the quality of migratory bird habitat. ■ Site water run-off and erosion may result in changes to the quality of migratory bird habitat. ■ Site traffic and transportation of personnel and materials to site may result in increased mortality to migratory birds. ■ Improper management and storage of conventional and hazardous waste may result in changes to the quality of migratory bird habitat and/or mortality.	■ Avoid restricted activity periods, to the extent practical, to limit effects on nesting migratory birds during sensitive time periods. If sensitive periods cannot be avoided, pre-clearing wildlife sweeps will be completed. ■ Use and maintain noise suppression (i.e., mufflers) on vehicles and inspect regularly to make sure they are functioning properly. ■ To the extent practical, work in sensitive areas (e.g., erosive soils, wetland features) would be scheduled to avoid periods that may result in high flow volumes and/or increase erosion and sedimentation (e.g., spring freshet). ■ Limit vehicle speed on unpaved site roads to reduce fugitive dust. ■ Implement water management systems to control/divert/collect on-site water. ■ Implement progressive reclamation and revegetation of disturbed areas no longer required. ■ Conventional and hazardous waste would be managed, stored and disposed of according to federal and provincial regulations.

Table 7.2-2: Potential Changes to Migratory Birds

Project Phase	Potential Change to the Environment Prior to Mitigation	Standard Mitigation Examples
Operation	■ Operational activities may result in sensory disturbance (e.g., presence of people, air traffic, lights, dust, smells, noise), which can affect the quality of migratory bird habitat. ■ The operation of water treatment facilities and the management of wastewater and site water runoff can influence hydrological processes, including water quantity and flow dynamics, and therefore, affect migratory bird habitat. ■ Water required for operations (e.g., mechanical draft cooling) may result in changes to migratory bird habitat due to decreased flow and water levels in the Peace River. ■ Site water run-off and erosion may result in changes to the quality of migratory bird habitat. ■ Improper management and storage of conventional and hazardous waste may result in changes to the quality of migratory bird habitat and/or mortality.	■ Use and maintain noise suppression (i.e., mufflers) on vehicles and inspect regularly to make sure they are functioning properly. ■ Recycle and reuse process water to reduce freshwater intake from the Peace River to the extent practical. ■ Limit vehicle speed on unpaved site roads to reduce fugitive dust. ■ Implement water management systems to control/divert/collect on-site water. ■ Wastewater will be treated and tested before being discharged to the environment. ■ Implement progressive reclamation and revegetation of disturbed areas no longer required. ■ Conventional and hazardous waste would be managed, stored and disposed of according to federal and provincial regulations.
Decommissioning	■ Operation of equipment may result in sensory disturbance (e.g., presence of people, air traffic, lights, dust, smells, noise), which can affect the quality of migratory bird habitat. ■ Site water run-off and erosion may result in changes to the quality of migratory bird habitat.	■ Develop and implement a Preliminary Decommissioning Plan. ■ All construction/demolition materials will be removed from the site once work is complete. ■ Disturbed areas will be reclaimed and revegetated. ■ Post-closure inspections and monitoring will be completed.

7.3 Changes Related to the Biophysical Environment

The biophysical environment includes components such as air quality, groundwater, surface water, terrain and soils, vegetation, and wildlife and wildlife habitat. Table 7.3-1 provides examples of anticipated interactions and mitigation measures with the biophysical environment. This list of interactions will be expanded upon through engagement with Indigenous Nations and Communities, the public, and regulators. Environmental design features and mitigation will also require input from Indigenous Nations and Communities, the public, and regulators. The Impact Statement will provide a comprehensive assessment of the potential changes with implementation of environmental design features and mitigations, and monitoring programs to validate the impact assessment predictions.

Table 7.3-1: Potential Changes to the Biophysical Environment

Project Phase	Potential Change to the Environment Prior to Mitigation	Standard Mitigation Examples
Site Preparation	■ Land clearing may cause: – increased air quality and fugitive dust emissions, and acoustic levels – loss and/or alteration of soils and vegetation, and wildlife habitat – injury or mortality to animals with low mobility (e.g., turtles, denning Burrowing owls) – introduction and spread of noxious, exotic, and/or invasive plant species ■ Excavation, drilling, and land clearing activities may alter the permeability and flow of groundwater, affecting recharge rates and aquifer storage. ■ Operation of site preparation equipment may cause: – increased air quality and fugitive dust emissions, and acoustic levels – sensory disturbance (e.g., presence of people, air traffic, lights, dust, smells, noise) to wildlife and nearby residences ■ Site water run-off and erosion may cause: – changes in surface water and sediment quality – loss and/or alteration of soils and vegetation, wetlands and wildlife habitat ■ Improper management and storage of conventional and hazardous waste: – changes in surface water and sediment quality – loss and/or alteration of soils and vegetation, and wildlife habitat – injury or mortality to wildlife	■ Optimize the use of cleared areas for Project activity and use existing infrastructure (e.g., roads), where practical. ■ Implement dust suppression techniques such as watering of roads during dry and windy conditions. ■ Avoid restricted activity periods, to the extent practical, to limit effects on wildlife during sensitive time periods. If sensitive periods cannot be avoided, pre-clearing wildlife sweeps will be completed. ■ To the extent practical, work in sensitive areas (e.g., erosive soils, wetland features) would be scheduled to avoid periods that may result in high flow volumes and/or increase erosion and sedimentation (e.g., spring freshet). ■ Implement water management systems to control/divert/collect on-site water. ■ Conventional and hazardous waste would be managed, stored and disposed of according to federal and provincial regulations.
Construction	■ Installation of the water intake infrastructure may cause: – loss and/or alteration of riparian and wildlife habitat ■ Operation of construction equipment may cause: – sensory disturbance (e.g., presence of people, air traffic, lights, dust, smells, noise) to wildlife and nearby residences – introduction and spread of noxious, exotic, and/or invasive plant species ■ The excavation for the reactor building may require dewatering to lower the water table near the excavation. thereby changing the flow rate of groundwater. ■ Water required for construction may cause: – changes to water quantity and flow dynamics in the Peace River – changes to wetlands and riparian areas, and wildlife habitat ■ Site traffic and transportation of personnel and materials to site may cause: – changes to water, soils, vegetation, and wildlife habitat quality from dust deposition – increased mortality to wildlife from vehicle collisions ■ Construction activities and road development may cause: – disruptions to natural drainage patterns and infiltration rates ■ Site water run-off and erosion may cause: – changes in surface water and sediment quality – loss and/or alteration of soils and vegetation, and wildlife habitat ■ Improper management and storage of conventional and hazardous waste: – changes in surface water and sediment quality – loss and/or alteration of soils and vegetation, and wildlife habitat – injury or mortality to wildlife	■ Avoid restricted activity periods, to the extent practical, to limit effects on nesting migratory birds during sensitive time periods. If sensitive periods cannot be avoided, pre-clearing wildlife sweeps will be completed. ■ Use and maintain noise suppression (i.e., mufflers) on vehicles and inspect regularly to make sure they are functioning properly. ■ To the extent practical, work in sensitive areas (e.g., erosive soils, wetland features) would be scheduled to avoid periods that may result in high flow volumes and/or increase erosion and sedimentation (e.g., spring freshet). ■ Implement dust suppression techniques such as watering of roads during dry and windy conditions. ■ Limit vehicle speed in accordance with conditions (e.g., wildlife use of road, road conditions, grade, weather, and loads on vehicle). ■ Implement water management systems to control/divert/collect on-site water. ■ If dewatering is required for the excavation of the reactor building, the infiltration water that is pumped out will be treated and tested before being discharged to the environment. ■ Implement progressive reclamation and revegetation of disturbed areas no longer required. ■ Conventional and hazardous waste would be managed, stored and disposed of according to federal and provincial regulations.

Project Phase	Potential Change to the Environment Prior to Mitigation	Standard Mitigation Examples
Operation	■ The operation of water treatment facilities and the management of wastewater and site water runoff may cause: – changes to the hydrological processes, including water quantity and flow dynamics – changes to water and sediment quality – changes to the quality of riparian areas, and wildlife habitat ■ Water required for operations (e.g., mechanical draft cooling) may cause: – changes to water quantity and flow dynamics in the Peace River – changes to wetlands and riparian areas, and wildlife habitat ■ Operational activities may cause: – sensory disturbance (e.g., presence of people, air traffic, lights, dust, smells, noise) to wildlife and nearby residences ■ Site traffic and transportation of personnel and materials to site may cause: – changes to water, soils, vegetation, and wildlife habitat quality from dust deposition – increased mortality to wildlife from vehicle collisions ■ Site water run-off and erosion may cause: – changes in surface water and sediment quality – loss and/or alteration of soils and vegetation, and wildlife habitat ■ Improper management and storage of conventional and hazardous waste may cause: – changes in surface water and sediment quality – loss and/or alteration of soils and vegetation, and wildlife habitat – injury or mortality to wildlife – attraction of wildlife to the Project site and increase the potential for human-wildlife interactions	■ Avoid restricted activity periods, to the extent practical, to limit effects on nesting migratory birds during sensitive time periods. If sensitive periods cannot be avoided, pre-clearing wildlife sweeps will be completed. ■ Use and maintain noise suppression (i.e., mufflers) on vehicles and inspect regularly to make sure they are functioning properly. ■ To the extent practical, work in sensitive areas (e.g., erosive soils, wetland features) would be scheduled to avoid periods that may result in high flow volumes and/or increase erosion and sedimentation (e.g., spring freshet). ■ Implement dust suppression techniques such as watering of roads during dry and windy conditions. ■ Limit vehicle speed in accordance with conditions (e.g., wildlife use of road, road conditions, grade, weather, and loads on vehicle). ■ Implement water management systems to control/divert/collect on-site water. ■ Wastewater will be treated and tested before being discharged to the environment. ■ Recycle and reuse process water to reduce freshwater intake from the Peace River to the extent practical. ■ Implement progressive reclamation and revegetation of disturbed areas no longer required. ■ Conventional and hazardous waste would be managed, stored and disposed of according to federal and provincial regulations. ■ Domestic waste (e.g., food) would be collected and stored in wildlife proof containers.
Decommissioning	■ Operation of equipment may result in sensory disturbance (e.g., presence of people, air traffic, lights, dust, smells, noise), which can affect the quality of migratory bird habitat. ■ Site water run-off and erosion may result in changes to the quality of migratory bird habitat.	■ Develop and implement a Preliminary Decommissioning Plan. ■ All construction/demolition materials will be removed from the site once work is complete. ■ Disturbed areas will be reclaimed and revegetated. ■ Post-closure inspections and monitoring will be completed.

7.4 Changes Related to the Socio-Economic Environment

There are many types of potential interactions that could occur between the Project and the broader public community, including Indigenous Nations and Communities. Population change from Project employment opportunities can place strain on services and pressure on community infrastructure, even if a portion of the population influx is temporary. Given that the Project will be situated in an environment of small rural towns and communities, and requires a sizable construction and operations workforce, Project interactions with socio-economic components are expected. These include the interactions related to the health, social, and economic context, including public health impacts, community well-being, access to services, healthcare infrastructure, employment opportunities, income distribution, housing affordability, economic sustainability, environmental factors, and social equity. Completion of the IS will provide a comprehensive review of the expected interactions including an assessment of both the positive and negative effects. Measures to maximize positive effects and minimize and manage negative socio-economic effects will be identified in the IS. Temporary worker's accommodation facilities will most likely be needed and could mitigate some effects typically associated with population influx. However, workers accommodation camps and the presence of a temporary workforce also have the potential to disrupt communities. Locations of workers accommodations, potential impacts and impact management will be discussed with communities through engagement activities.

7.4.1 Health, Social, and Economic Factors

There are considerable potential positive effects on the economy within the region. These activities create employment opportunities for local residents, ranging from skilled labour for construction to specialized technicians for operation and maintenance. Additionally, the demand for goods and services stimulates local businesses, including suppliers of construction materials and heavy equipment rental companies. The influx of workers and increased economic activity can also boost local infrastructure development, such as roads and utilities, further enhancing the region's economy. Furthermore, decommissioning and restoration activities provide ongoing employment opportunities and support local businesses involved in environmental remediation and waste management.

The Project will create job opportunities, stimulating economic growth, and improving livelihoods within the community over multiple decades. Nuclear energy production also provides a reliable and consistent source of electricity, contributing to energy security and reducing dependence on fossil fuels. This transition to clean energy produces minimal GHG emissions, supporting objectives for addressing the influence of climate change and its adverse effects.

Conversely, during construction, an influx of workers could increase demand on housing and services. Construction may also generate noise, dust and vibrations that may affect community quality of life. In addition, operations may cause some members of the community to be less satisfied with living in their community, as an operating reactor may influence their feelings of safety and security. Completion of the IS will provide a comprehensive review of the expected interactions including an assessment of both the positive and negative effects on the health, social, and economic factors in the region.

7.4.2 Recreational Land Use

The Project may have a potential effect on recreational land use that could result from land acquisition, restrictions on activities in close proximity to the facility, and changes to the local landscape. Changes in land use could lead to the decline of recreational opportunities or alterations to existing recreational amenities, influencing the overall recreational experience for local residents and visitors. However, the Project has the potential to positively influence recreational areas by creating employment opportunities and drawing new users to the surrounding area, generating funding for conservation initiatives, and stimulating local economies.

Northern Alberta offers many recreational activities year-round, with diverse opportunities for leisure and enjoyment during both summer and winter seasons. By carefully considering both the challenges and opportunities, the Project has the potential to contribute positively to recreational land use and community well-being. The IS will identify and evaluate potential effects and will build an understanding of the importance of communities' land and water use to support the development of appropriate mitigation plans and activities associated with recreational land use.

7.4.3 Gender-Based Analysis Plus

A Gender-Based Analysis Plus (GBA+) framework will be developed and applied to the Project to align with requirements of the IAA and guidance found in the Practitioner's Guide to Federal Impact Assessments under the IAA (IAAC 2021).

The GBA+ is an analytical process that identities who is impacted by a project and assesses how they may experience impacts differently, in order to develop mitigation measures to address these differential impacts. The guidance refers to diverse population groups within the general population and within communities by sex, gender, age, ethnicity, indigeneity, socio-economic status, health status, and any other community-relevant identity factors.

Canadian research has highlighted the links between resource development projects and risks of gender-based violence and sexual harassment for Indigenous, Métis, and Inuit women in Canada (MMIWG 2019; PIWC 2021). It is standard in social impact assessment to consider how a project may affect different groups that are historically excluded or more vulnerable to a project's adverse effects. GBA+ involves engaging with diverse groups in communities to identify potential impacts and risks and to develop mitigation measures collaboratively.

To support GBA+, socio-economic data collected for the Impact Assessment will be sufficiently disaggregated to support the analysis of disproportionate effects as per GBA+ intersectional approach. Qualitative information, including on equality, diversity and inclusion, and related to gender-based violence, economic participation, discrimination and unfair treatment, will be collected from studies and consultations. Effects will be described based on both data collected and concerns expressed through engagement with Indigenous Nations and Communities. At a minimum, future socio-economic baseline studies will:

- Describe how community members differ in access to resources, opportunities and services;
- Describe how diverse groups could experience more negative effects or receive fewer benefits related to the Project;
- Describe mitigation and enhancement measures to address differential impacts; and
- Describe management plans to support protected communities and vulnerable members as part of the Impact Assessment.

7.5 Federal Lands or Lands Outside of Alberta

The Project is located in Alberta and no changes to the environment, in another province, or outside of Canada, or on federal lands are anticipated. The Project is located along the Peace River, which is part of the Great Slave Lake Drainage system and flows through Alberta to the Northwest Territories. Potential impacts will be further assessed in the IS.

7.6 Impacts to Indigenous Peoples

Potential impacts to the environment can be intricately linked to potential impacts to Indigenous and Treaty Rights and way of life, specifically those social or environmental changes that may alter the physical and cultural ways that Indigenous Nations and Communities interact with and relate to the environment.

The potential impacts on Indigenous Nations and Communities, encompassing physical and cultural heritage, current land and resource use for traditional purposes, and the significance of any historical, archaeological, paleontological, or architectural elements, is currently not available. This information will be provided as soon as it becomes available or is obtained through Indigenous engagement activities, to the extent that Indigenous Nations and Communities are willing to share such information publicly.

7.6.1.1 Traditional Land and Resource Use

Indigenous Nations and Communities with potential historical land and resource use or interest in the Project are identified in Section 3.2.2.

The majority of the Project site for both Option 1 and Option 2 is located on agricultural land and does not take place on federal Crown lands. Within the immediate area of the Project site, activities including traffic, lights, and noise can influence the quality of wildlife habitat and wildlife use of the landscape. These changes also have the potential to affect the use of the regional area for hunting, fishing, plant gathering, and other cultural uses. The water use infrastructure for the Project will be within and adjacent to the Peace River and has the potential to cross provincial Crown land with natural vegetative cover. The Impact Assessment will determine if the Project has the potential to result in regional impacts on water quality or quantity, wildlife and fish habitat, landscapes, and other features of the environment that are important to Indigenous use of, and relationship with, the land. Cumulative impacts are expected to be important to potentially affected Indigenous Nations and Communities, as will the continued ability to transfer cultural knowledge to youth.

Energy Alberta is committed to engaging with Indigenous Nations and Communities in the area, including support for community led studies such as TLRU, IK and/or country food studies to fully understand past and present uses of lands and resources.

7.6.1.2 Cultural Resources

Historic resources are protected in Alberta by the HRA which is administered by ACSW. The Listing of Historic Resources (Listing) identifies lands that contain or are believed to contain historic resources. HRA approval is required for most projects with footprints that overlap with the Listing. Projects that require the completion of an Impact Assessment or require approval by the Canadian Energy Regulator or Alberta Utilities Commission require HRA approval, regardless of the presence of listed lands.

Alberta HRA approval will therefore be required for the Project to attain regulatory approval. This may include the assessment, mitigation, and clearance of archaeological, paleontological, historic, and cultural (traditional use) locations that may be present.

7.7 Impacts to the Health, Social, and Economic Conditions of Indigenous Peoples

Health, social, and some economic impacts on Indigenous communities are often a result of population change in the region driven by economic development. Generally, data in the region of the Project show that the economy is relatively small, not as diversified as the provincial economy, and weighted to primary and resource development sectors. Secondary activities appear closely tied to the primary sector and are directly affected by it. Unemployment rates are slightly lower than for Alberta. Historically, population growth in the region has been relatively modest, seeing declines in most communities. By comparison, Alberta's population grew 3.67% from 2022 to 2023 and 4.41% from 2023 to April 2024.

Indigenous Nations and Communities could be affected by an increase in demand for health services, childcare services and housing, as a result of population change in the region and in Indigenous communities. Costs of consumables could increase with rapid population increase and resulting increased demand, which can affect food security and health. Temporary workers accommodations can bring new employment and procurement opportunities but also require management planning to limit negative interactions between workers and communities.

In addition, people may have changed perceptions of risk and feelings of personal security and well-being related to the presence of a nuclear facility in proximity to Indigenous Nations and Communities. Over time, and with ongoing engagement with communities, people are expected to become more knowledgeable of nuclear energy generally, and the Project, thus becoming more comfortable living in its vicinity. An operator in Ontario has used independent polling to survey residents and communities neighbouring a nuclear facility on their perceptions of safety. Results of surveys have shown a high percentage of respondents are confident that the nuclear facility is operating safely. The mitigating factors in improving perceptions of nuclear energy are related to providing information on how nuclear energy is regulated in Canada, regular engagement with communities, and providing jobs locally, whereby residents obtain experience working at a nuclear facility and raise awareness of safe operations.

The Project is expected to have a stimulative impact on the region, as employment opportunities are created, and commodities and services are purchased by the Project. Many of the jobs created during construction and operations require skilled personnel and hence offer above average income opportunities for workers. It is expected that in-migration will fill many of the more highly skilled direct positions. However, it should be noted that the 8-to-12-year construction period will allow for substantial training opportunities for local residents and a number of previous out-migrations from the region can be reasonably expected to return, including Indigenous People that have been living off reserve, or in other communities.

Additional work is required to fully predict at both the local and national scale the construction and operations workforce estimates beyond the Canada wide numbers described in the 2024 report by the Conference Board of Canada (CBC 2024). Early estimates of the Project construction workforce indicate up to 5,000 workers at peak and the full operations workforce of between 2000 and 3000 workers, including indirect contractors. Expanded regional activity will benefit local residents as economies grow and diversify, both public and private sector services also tend to grow and diversify. However, increased activity levels could put some upward pressure on wages and prices and cause some other disruptions in local markets.

The proponent is committed to engaging with Indigenous Nations and Communities to identify opportunities for employment, contracting, and procurement of goods and services in all stages of Project development, thus resulting in positive economic benefits for Indigenous Nations and

Communities. Additionally, the proponent is supportive of economic partnerships with Indigenous Nations and Communities.

7.8 Greenhouse Gas Emission Estimates

Nuclear power emits just a few grams of carbon dioxide (CO_2) equivalent per kilowatt hour (kWh) of electricity produced. Based on the United Nations (UN) Intergovernmental Panel on Climate Change (IPCC) study, this equates to 12g CO_2 equivalent/kWh for nuclear (World Nuclear Association 2024).

The net GHG emissions associated with the Project will be evaluated as part of the Impact Assessment. However, limited information is currently available to estimate GHG emissions for each phase of the Project. As such, expected emission sources, as well as an explanation on how emissions could be estimated for each Project phase, is presented below.

Table 7.8-1 provides a summary of expected emissions sources for each Project phase. This list provides typical emissions sources that may be expected during each phase of the Project; however, it should not be considered exhaustive. Additional emission sources may exist and will be identified (as required) throughout the assessment stage of the Project.

Table 7.8-1: Expected GHG Emission Sources - By Project Stage

Project Stage	Expected GHG Emission Sources
Site Preparation and Construction	■ Land clearing (one-time vegetation loss and annual carbon sink loss); ■ Mobile emission sources (e.g., heavy-duty excavation equipment); and ■ Stationary emission sources (e.g., contractor trailer generators).
Operation	■ Mobile emission sources (e.g., light-duty maintenance truck); ■ Stationary emission sources (e.g., utility emissions such as electricity usage and natural gas); and ■ Facility testing emissions (nuclear and/or non-nuclear).
Decommissioning	■ Mobile emission sources (e.g., heavy-duty demolition equipment); and ■ Stationary emission sources (e.g., contractor trailer generators).

The GHG emissions from the Project during the Site Preparation and Construction, the Operation and Decommissioning phases have been estimated using the U.S. EPA AP-42 emission factors (U.S. EPA 2024), and other source information derived for early plant parameter data. The estimated GHG emissions for the Project during the Site Preparation and Construction phase are provided in Table 7.8-2. GHG emissions expected during this phase including emissions from on-site combustion equipment and on-site roads. The estimated GHG emissions for the Project during the Operations and Maintenance phase are provided in Table 7.8-3.

Note that the site preparation and construction phase timelines given in Section 4.5.1 and the data provided in Table 7.8-2 are very preliminary estimates and subject to change; as such, only two years of site preparation and three years of construction data are included in Table 7.8-2. Additional work as part of the IS will be required to provide a realistic estimate by year total emissions during each phase of the Project.

The estimations provided in the tables are considered over-estimates because they are based on conservative assumptions such as the operating hours for all equipment are continuous and the amount and type of equipment required for construction of each unit is the same. However, it is also assumed that the site preparation and construction equipment used will comply with emissions regulations in place at the time the Project proceeds and will be serviced so that there are no unexpected emission-increasing faults or features. Similarly, the natural gas emergency generators and auxiliary steam boilers will be state-of-the-art equipment and will comply with emissions regulations in place at the time the Project proceeds.

Table 7.8-2: Annual Greenhouse Gas Emissions – Site Preparation and Construction Phase

Source	Emission Rate (tonnes/y)				
	Site Preparation		Construction		
	Year 1	Year 2	Year 3	Year 4	Year 5
Carbon Dioxide (CO_2)					
Parking Lot Tailpipe	31	31	297	297	290
Haul Truck Tailpipe	856	505	614	614	316
Paved Road Tailpipe	138	100	475	475	400
Stationary Equipment	-	1211	1733	1733	523
Non-Road Tailpipe	376	400	586	586	302
Total	1401	2247	3705	3705	1831
Methane (CH_4) – given as equivalent CO_2 values					
Parking Lot Tailpipe	0.1	0.1	0.9	0.9	0.9
Haul Truck Tailpipe	0.4	0.2	0.3	0.3	0.1
Paved Road Tailpipe	0.1	0.1	1.0	1.0	0.9
Stationary Equipment	0.0	1.7	2.4	2.4	0.7
Non-Road Tailpipe	0.2	0.2	0.3	0.3	0.2
Total	**0.8**	**2.3**	**4.8**	**4.8**	**2.8**
Total CO_2 (eq) tonnes	**1402**	**2249**	**3710**	**3710**	**1834**

Table 7.8-3: Annual Greenhouse Gas Emissions – Operation Phase

Source	CO_2 (tonnes/y)	CH_4 (as CO_2 [e])) (tonnes/y)	Total CO_2 (eq) (tonnes/y)
Emergency Power Generator	893	-	**893**
Auxiliary Steam Boiler	1315	0.1	**1315**
On-Site Roads	52	0.0	**52**
Site Total	**2260**	**0.1**	**2260**

The GHG emissions for the Project will be more concisely estimated using methodology consistent with the SACC Draft Technical Guide developed by ECCC (GOC 2021a).

The GHG emissions associated with land-use change will only include CO_2 and methane (CH_4), following the proposed method for estimation. The CO_2 emissions from land-use change include the annual carbon sink loss and the one-time loss of carbon from land clearing activities. The land disturbance emissions during site preparation activities will be calculated using the method described in the 2006 IPCC Volume 4, Chapter 2 (IPCC 2006). The calculation of the total carbon stored annually, and therefore lost with the removal of vegetation, will be calculated based on Equation 2.9 and Equation 2.10 (Tier 1) in Section 2.3.1.1.A of the 2006 IPCC Volume 4, Chapter 2 (IPCC 2006). The CH_4 emissions from annual sink loss will be calculated using Equation 7.12 from Chapter 7 of the IPCC 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories (IPCC 2019). This calculation methodology is consistent with methodology provided in the IPCC 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories (IPCC 2019) and the Draft Technical Guide Related to the SACC (GOC 2021a).

The GHG emissions associated with construction activity related emissions will consider all mobile and stationary sources associated with construction. Once construction duration, schedule, and the types and number of equipment expected on site is known, construction related emission can be estimated.

The GHG emissions associated with the operations phase will be estimated for the Project. This will include yearly operation emissions and total operation emissions over the operational lifespan of the Project, which will be estimated using the expected energy output of the nuclear power facility. Emissions from decommissioning and safe storage phase are expected to be minimal but will be considered later when more detailed information is available on schedule, duration, and decommissioning activities.

In alignment with the SACC, an upstream GHG assessment will only be conducted if estimated annual emissions exceed the thresholds put forth in Section 5, Table 15 of the SACC ECCC 2020a. However, it is important to note as a proposed non-emitting energy Project, this undertaking would strongly support Canada's strategic energy transition objective and goal of achieving net-zero emissions by 2050. In addition, this proposed Project aligns with the Government of Alberta's Emissions Reduction and Energy Development Plan and will be strategic in Alberta's energy transition and emission reduction aspirations (GOA 2024a). Throughout the assessment stage of this proposed Project, net-missions will be considered against Canada's objective of becoming net-zero by 2050.

7.9 Waste and Emissions

The following section outlines potential waste and emissions that may occur as a result of the Project to the air, in or on water, and in or on land, during any phase of the Project. Emissions and waste management options including handling, disposal, and storage will be further assessed and evaluated in the Impact Assessment.

7.9.1 Atmospheric Emissions

The potential air emissions that may occur as a result of the Project during all phases are listed below. See also Section 7.8.

Site Preparation and Construction: Criteria air contaminants may be released to the atmosphere from construction vehicles and equipment exhaust, fossil fuel power generation, and any explosive used in blasting, including the following:

- oxides of nitrogen (NO_x)
- sulphur dioxide (SO_2)
- carbon monoxide (CO)
- carbon dioxide (CO_2)
- particulate matters (PM) (i.e., total suspended particulates [TSP], particulate matter with a nominal diameter of 10 microns or less [PM_{10}], and particulate matter with a nominal diameter of 2.5 microns or less [$PM_{2.5}$])
- fugitive dust from site preparation and construction activities (e.g., road dust, earth moving activities, crushing, blasting)

Operations: Air emissions that may be emitted during operations may include the following:

- NOx
- SO_2

- CO_2
- PM
- hydrazine
- morpholine
- ammonia
- radiological emissions (typical radioactive materials monitored in terms of atmospheric release from CANDU reactors are tritium, Iodine-131, Carbon-14, noble gases and radioactive particulates)

Decommissioning: The air emissions expected from the Project decommissioning are similar to those from the site preparation and construction, with the addition of radiological emissions (specific radionuclides (primarily Carbon 14 and Tritium) /radionuclide groups dependent upon CANDU MONARK technology).

7.9.2 Liquid Effluents

The potential liquid effluents that may occur as a result of the Project during all phases are listed below. These include contaminants of potential concern (COPC) and may be released to the environment through accident or malfunction.

Site Preparation and Construction: The following are typical liquid waste products during site preparation and construction:

- **Concrete Washout**: Water containing cement, sand, and other materials, created as a result of cleaning concrete mixers and tools.
- **Wastewater**: Water that may contain other materials, created as a result from site dewatering, equipment cleaning, run off during weather events, and other construction activities.

In addition, the following may be waste products when there is excess or leftover material after site preparation or construction activity. These are also COPC that may be released to the terrestrial and/or aquatic environment through accident or malfunction of equipment, processes, etc.

- **Coatings and Chemicals**: Liquid substances such as paints, solvents, adhesives, sealants.
- **Drilling Fluid / Mud:** Water, oil, synthetic or polymer-based liquids (e.g., bentonite).
- **Machinery related fuels, oils, lubricants**: Substances such as gasoline, transmission fluids, hydraulic, engine and gear oils, greases, coolants, etc.
- **Agricultural chemicals**: Chemicals such as herbicides (e.g., Glyphosate, 2,4-D), insecticides (e.g., Permethrin, Cypermethrin), rodenticides (e.g., Bromadiolone, Difenacoum) and fungicides (e.g., Chlorothalonil, Mancozeb).

Operations: The following are the typical liquid waste products produced during operation:

- Alum
- Ammonia
- Sodium Hypochlorite
- Wastewater (potable and sanitary)
- Radiological effluents (specific radionuclides/radionuclide groups dependent upon CANDU MONARK technology)

In addition, the following liquids are used during operations and may be COPC.

- Machinery related fuels, oils, lubricants: Substances such as gasoline, transmission fluids, hydraulic, engine and gear oils, greases, coolants, etc.
- Equipment related corrosion inhibitors: Substances such as morpholine, hydrazine.
- Other potential waste products/contaminants: Chlorides, sulphates, chromium, copper, total dissolved and suspended solids, liquids containing waste heat.

Decommissioning: Typically, waste products during decommissioning will include those listed in other phases, with addition of process liquids.

7.9.3 Solid Wastes

The potential solid wastes that may occur as a result of the Project during all phases are listed below. These include COPC and may be released to the environment through accident or malfunction.

Site Preparation and Construction: The following are the typical solid waste products produced during site preparation and construction:

- **Concrete**: Broken or leftover concrete.
- **Wood Scraps**: Off-cuts and unused pieces of lumber from framing and other woodwork.
- **Metal Scraps**: Leftover or discarded metal pieces from structural components and fittings including rebar.
- **Drywall and Insulation**: Off-cuts and waste from installing drywall and insulation materials.
- **Plastic Waste**: Materials such as PVC pipes, packaging, and insulation.

Quantities are unknown at this time but is it typical to assume a certain small percentage of the overall quantity of material used for construction will be waste.

Operations: The following are the typical solid waste products produced during operations:

- **Water treatment related:**
  - Spent Filters and Membranes
  - Spent Resin and Activated Carbon
  - Other items like sludge, sand, charcoal
- **Electrical related**: Items such as spent batteries from the power supply distribution system, electronics.
- **Household/domestic waste:** Items like personal protective equipment, packaging materials, maintenance consumables, glass, plastic, metal, cardboard, paper, wood, organics and food wastes (e.g., compost).
- **Radiological waste**: Items classified as low-, intermediate-, and high-level radiological waste.

Decommissioning: In addition to the suitable separated, assayed and packaged spent fuel and radioactive wastes from the decommissioning activities, the following are the typical conventional solid waste products produced during site decommissioning:

- Concrete
- Other general conventional waste safe for landfill or other normal municipal disposal

7.10 Sustainability

The IAA has several provisions that reference sustainability and how it is considered in the Impact Assessment process. One of the purposes of the IAA is to foster sustainability and respect the rights of Indigenous Peoples and to apply the precautionary principle (IAAC 2021, Paragraph 6 (1) (a) and the preamble of the Act and subsection 6(2)).

The Impact Statement will include an analysis of the extent to which the Project contributes to sustainability, either positively or negatively. The analysis will be qualitative but may draw on quantitative data. Engagement with Indigenous Peoples, the public, and other interested parties will be used to develop a framework for the sustainability assessment and to identify sustainability concepts and factors that should be considered based on the values, priorities, and needs of those engaged.

The sustainability framework will provide a clear and transparent process for evaluating the ecological resilience of potentially affected renewable resources as indicators of productive capacity. Project-related impacts identified in the Impact Assessment will be used in the sustainability assessment to determine whether those impacts will have a positive or negative effect on the identified key values and issues. Examples of renewable resources include aquatic systems, water supply, fish species, wetland, timber resources and others. Effects from the biophysical and socio-economic disciplines will be considered in the sustainability assessment as relevant.

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Appendix A: Indigenous Engagement Plan

ENERGY Alberta

Peace River Nuclear Power Project

Indigenous Engagement Plan

Report No. CA0038431-R-24004

April 11, 2025

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ABBREVIATIONS AND UNITS OF MEASURE

Abbreviation	Definition
ACO	Aboriginal Consultation Office
AER	Alberta Energy Regulator
AFN	Assembly of First Nations
BCER	BC Energy Regulator
CNSN	Canadian Nuclear Safety Commission
DIA	Detailed Impact Assessment
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EPEA	Environmental Protection and Enhancement Act
IAAC	Impact Assessment Agency of Canada
IA	Impact Assessment
IBA	Impact Benefit Agreement
IPD	Initial Project Description
ISC	Indigenous Services Canada
MOU	Memoranda of Understanding

1 CORPORATE COMMITMENT TO ENGAGEMENT

Energy Alberta is committed to open, extensive and thorough engagement as a vital component to the success of the Project. We aim to build and sustain meaningful relationships based on mutual respect and trust with Indigenous Nations and Communities, non-Indigenous Stakeholders, local communities and other potentially affected parties. Energy Alberta recognizes the importance of engaging early and often to understand each group's unique interests. This is consistent with Energy Alberta's efforts to create a made-in-Alberta solution to inclusive long-term energy stability.

In alignment with its corporate, environmental, and social responsibilities, Energy Alberta is committed to undertaking engagement that will meet or exceed consultation and engagement requirements from federal and provincial agencies, and it will also draw upon current best practices for engagement in resource development.

2 OBJECTIVES OF INDIGENOUS ENGAGEMENT

The focus of Energy Alberta's Indigenous engagement plan is building meaningful relationships, contributing to economic reconciliation, and ensuring the inclusion of Indigenous perspectives. It involves gathering feedback from Indigenous Nations and communities on potential impacts to traditional lands, resources, and cultural values. Energy Alberta aims to achieve collaboration, foster understanding, work toward mutually beneficial outcomes that respect both legal obligations and community needs. Key objectives of the engagement plan include:

- **De**velop Long-Term Partnerships: Establish enduring partnerships that extend beyond the Project's completion, fostering continuous collaboration and mutual benefits.
- Respect Indigenous Rights and Treaties: Acknowledge and uphold Indigenous Rights, including Treaty Rights, ensuring that the Project respects legal and ethical obligations.
- Engagement with Indigenous Nations and Communities: Regarding Indigenous Knowledge they may wish to apply when considering cumulative impacts, or any other cultural considerations and customs that should be considered in Project decision-making.
- Foster Strong Relationships: Build trust and maintain open, respectful communication with Indigenous Nations and Communities throughout the project's lifecycle.
- Ensure Meaningful Participation: Involve Indigenous Nations and Communities in decision-making processes, ensuring their perspectives and knowledge are integrated into project planning and execution.
- Promote Economic Opportunities: Create employment, training, and business opportunities for Indigenous Nations and Communities, supporting their economic growth and self-determination.
- Respect Cultural Heritage: Recognize and protect Indigenous cultural sites, traditions, and practices, ensuring that the Project aligns with community values.
- Support Capacity Building: Provide resources and training to empower Indigenous Nations and Communities to participate fully in project development, management, and operations.
- Enhance Environmental Stewardship: Collaborate with Indigenous Nations and Communities to ensure environmental protection measures align with Traditional Ecological Knowledge and practices.
- Ensure Transparent Communication: Maintain ongoing dialogue with Indigenous Nations and Communities, providing regular updates and addressing concerns in a timely and transparent manner.
- Collaborate on S**ustainability Initiatives:** Work in collaboration with Indigenous Nations and Communities to identify and advance, as appropriate, initiatives that promote sustainability, environmental protection, and community well-being.

3 APPROACH

Energy Alberta's engagement efforts are intended to be inclusive of Indigenous Nations, Bands, Communities, Métis Settlements and Groups potentially impacted by the Project. The term "Indigenous Nations and Communities" is used throughout Project documentation to represent this inclusion.

Engagement with Indigenous Nations and Communities is a corporate value of Energy Alberta, and a vital component of the Project process. Energy Alberta is committed to building meaningful, mutually-beneficial relationships with Indigenous Nations and Communities, guided by respect, integrity and a shared commitment to advancing reconciliation, and as outlined in its Indigenous Relations Policy and the principles below:

- **Respect for Indigenous Rights and Traditions:** Energy Alberta acknowledges the inherent and constitutionally protected rights of Indigenous Peoples and the significance of Indigenous Knowledge, values, and practices. Engagement will be conducted transparently, recognizing these rights as central to Energy Alberta's operations.
- **Commitment to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and Reconciliation:** Energy Alberta aligns its practices with the spirit and intent of UNDRIP and the principles of reconciliation, including addressing the Business and Reconciliation action of the Truth and Reconciliation Commission's Calls to Action.
- **Open, Respectful Communication:** Energy Alberta prioritizes open, respectful, and proactive communication with Indigenous Nations and Communities, ensuring their perspectives are considered in its decision-making processes. Energy Alberta is dedicated to ongoing dialogue and information sharing, with sensitivity to each community's unique values and cultural heritage.
- **Environmental Stewardship with Indigenous Knowledge:** Energy Alberta values Indigenous perspectives on environmental stewardship. Energy Alberta will actively integrate Indigenous Knowledge into its sustainability and environmental protection strategies, aiming to align its operations with Indigenous values of respecting the land and resources.
- **Equitable Economic Opportunities:** Energy Alberta is committed to creating economic opportunities for Indigenous Nations and Communities, including fair access to employment, training, and business partnerships. Energy Alberta seeks to support Indigenous economic growth by collaborating with Indigenous-owned businesses and investing in community-led initiatives.

Energy Alberta is also exploring the potential of economic participation of Indigenous Nations and Communities in the Project. In doing so, Energy Alberta aims to build meaningful partnerships so that Indigenous Nations and Communities are active participants in the economic benefits and environmental stewardship of the Project.

3.1 Understanding Indigenous Rights and Interests

A deep understanding of Indigenous Rights, interests, and values is fundamental to respectful and meaningful engagement. Indigenous Nations and Communities in the Peace River region hold unique Rights under Treaties 8 and 6, which must be acknowledged and carefully considered throughout the planning and implementation of the Project. This includes recognizing inherent rights to hunt, fish, trap, and gather on traditional lands, as well as spiritual and cultural connections to the land that may not always align with Western land-use concepts.

In-depth engagement is required to understand specific Indigenous interests. This may include studies on land use and occupancy mapping, gathering Indigenous Knowledge, and understanding how the Project may affect sacred sites, burial grounds, or areas of spiritual significance. A key aspect of this research is collaborating with Indigenous Nations and Communities Nations and Communities to develop research methodologies that respect Indigenous knowledge and integrated it into project planning without exploitation or misrepresentation. Energy projects may also raise particular concerns such as safety, long-term environmental stewardship, and potential impacts on water resources, all of which must be addressed in the context of Indigenous worldviews and concerns about intergenerational equity.

3.2 Spectrum of Engagement

Energy Alberta will undertake a spectrum of engagement on the Project as depicted in Figure 3.2-1 below, which is consistent with regulatory guidance (including the Impact Assessment Act, CNSC REGDOC1-1-1 and CNSC REGDOC-3-2-2) and best practices including International Association for Public Participation Canada's (IAP2) spectrum of engagement (IAP2 2024).

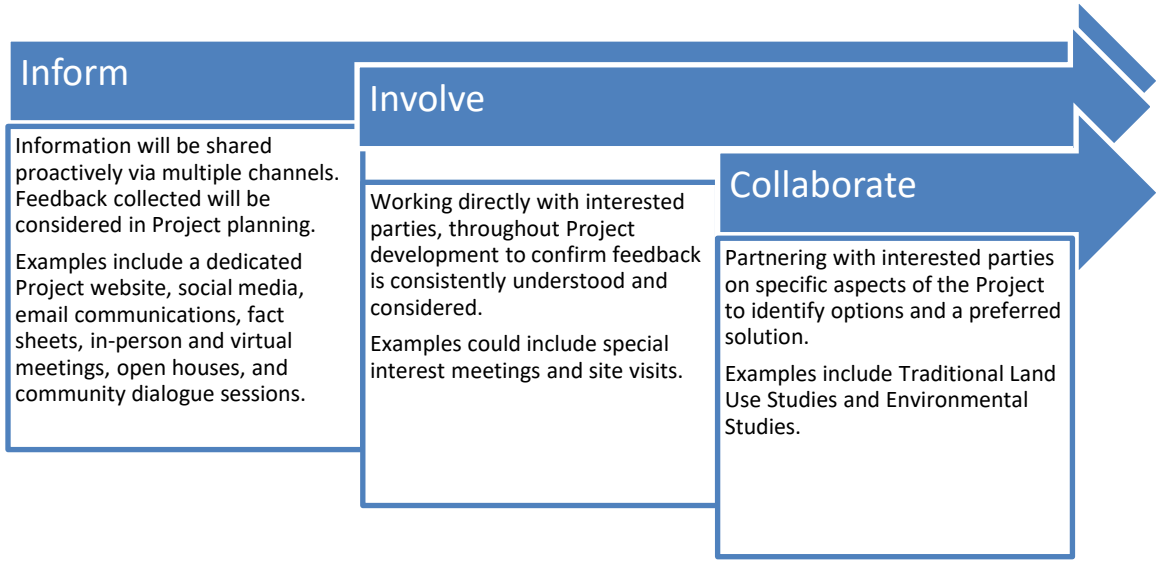


Figure 3.2-1: Spectrum of Engagement

3.2.1 Inform

This level of engagement focusses on keeping Indigenous Nations and Communities informed through information sharing and assisting in their understanding of the Project. This applies to less proximal Indigenous Nations and Communities with the least anticipated potential for adverse impacts. This could include Indigenous Nations and Communities that may have historical ties or general interest but are not anticipated to be impacted by the Project.

3.2.2 Involve

This level of engagement works to involve Indigenous Nations and Communities, understand their issues and concerns and incorporate them into the planning process for the Project to the extent possible. In addition, appropriate capacity funding will be provided so that communities can actively participate in engagement activities. This level of engagement may apply to Indigenous Nations and Communities near but not directly adjacent to the Project or with shared resources areas that may be indirectly affected. In addition, Indigenous Nations and Communities expressing strong cultural or economic interest in the Project or its outcomes, as well as those with traditional use within or near the Project zone may be undertake this level of engagement.

3.2.3 Collaborate

This level of engagement is the most comprehensive and involves collaborating with Indigenous Nations and Communities to understand areas of interest and concerns, identify potential opportunities, solutions and mitigations. In addition, appropriate capacity funding will be provided so that Indigenous Nations and Communities can actively participate in engagement activities, contribute Indigenous knowledge, and take part in technical discussions. This financial support may include funding for research, capacity development initiatives, community workshops, and the development of engagement materials.

3.2.4 Determining the Level of Engagement

In addition to seeking Indigenous Nations and Communities' input in determining the level of engagement to be implemented, the following factors will also be considered:

- Potential adverse impacts on asserted or established Indigenous or Treaty Rights;
- Historical and modern treaties;
- Settled or ongoing land claims and/or litigation;
- Claims based on Indigenous rights, or determined during the engagement process;

- Proximity of the Project to:
  - Indigenous Nations and Communities, traditional territories, historical and current land uses; and
  - Culturally significant sites such as sacred spaces, burial grounds, or heritage locations.
- Potential adverse environmental impacts directly affecting key resources or habitats critical to the community's traditional practices or livelihood;
- Potential loss or damage to language, customs, or Indigenous knowledge;
- Potential project effects on health and safety of Indigenous Nations and Communities; and
- Existing relationships between Indigenous Nations and Communities and Energy Alberta.

3.3 Engagement Tools and Methods

Energy Alberta has identified a range of specific tools and methods to facilitate meaningful engagement with Indigenous Nations and Communities. These include:

- **Respect for Indigenous Decision-Making Processes:** Recognizing and respecting the governance structures and decision-making processes of Indigenous Nations and Communities.
- **Community-Led Engagement:** Seeking Indigenous Nations and Communities' input in determining the engagement process according to their cultural practices and priorities.
- **In-person Meetings and Workshops:** Prioritizing in-person engagement with Indigenous Nations and Communities through meetings, workshops, and site visits, where possible, to build trust and to foster collaboration.
- **Traditional Knowledge Integration:** Integration of Indigenous Knowledge into the assessment process in a respectful and valued manner.
- **Mediation and Conflict Resolution**: Implementing mechanisms for resolving disputes and addressing concerns that arise during the lifecycle of the Project.
- **Language and Cultural Sensitivity**: Translating communication materials (e.g., fact sheets) into applicable Indigenous languages, as requested. Conducting engagement activities that are culturally sensitive and appropriate.
- **Capacity Building and Support**: Providing resources, training, and financial support to Indigenous Nations and Communities to fully participate in the assessment process.
- **Written Submissions and Documentation:** Offering opportunities for Indigenous Nations and Communities to submit their views and concerns in writing, confirming their input is officially recorded.

Engagement activities will respect each Indigenous Group's unique protocols and cultural practices, with respect to communications approaches. Feedback collected will be integrated into Project planning, with regular updates provided to demonstrate how Indigenous perspectives and input received are being considered in Project decisions.

4 EARLY ENGAGEMENT AND RELATIONSHIP BUILDING

Early engagement with Indigenous Nations and Communities is an essential foundation for the success of any major infrastructure or energy project. In Energy Alberta's Early Engagement and Relationship phase of the Project, we aim to build and sustain meaningful relationships based on mutual respect and trust.

Given that the Peace River region is home to several Indigenous Nations and Communities, it is crucial to initiate dialogue before detailed Project planning begins. This early stage of engagement involves identifying Indigenous Nations and Communities whose traditional territories, treaty rights, or land claims may be potentially impacted by the Project.

4.1 Identification of Potentially Impacted Indigenous Nations and Communities

Energy Alberta sought guidance from the Government of Canada First Nation Profiles Interactive Map and the Alberta Aboriginal Consultation Office Electronic Disposition System Landscape Analysis Tool, to determine a preliminary list of Indigenous Nations and Communities that may be potentially impacted by, or have interest in, the Project. Additional mapping and information provided by Indigenous Nations and Communities during Energy Alberta's early engagement activities also informed the list.

Early engagement has been initiated and undertaken to varying degrees with the following Indigenous Nations and Communities (listed in alphabetical order):

- Athabasca Chipewyan First Nation
- Beaver First Nation
- Cadotte Lake Métis Nation
- Dene Tha' First Nation
- Driftpile Cree Nation
- Duncan's First Nation
- East Prairie Métis Settlement
- Fort Chipewyan Métis Nation
- Gift Lake Métis Settlement
- Horse Lake First Nation
- Kapawe'no First Nation
- Little Red River Cree Nation
- Loon River First Nation
- Lubicon Lake Band
- Mikisew Cree First Nation
- Otipemisiwak Métis Government
- Paddle Prairie Métis Settlement
- Peavine Métis Settlement
- Peerless Trout First Nation
- Sawridge First Nation
- Sturgeon Lake Cree Nation
- Sucker Creek First Nation
- Swan River First Nation
- Tallcree Tribal Government

- Treaty 8 Leadership
- Whitefish Lake First Nation
- Woodland Cree First Nation

As engagement progresses, the list of potentially affected Indigenous Nations and Communities may be updated, based on interest and feedback from Indigenous Nations and Communities, and additional planning and guidance from applicable regulators.

4.2 Preliminary Topics of Interest

Based on feedback received through some introductory meetings and correspondence received to date, Energy Alberta has compiled a list of preliminary topics of interest to Indigenous Nations and Communities including, but not limited to, those listed in Table 4.2-1.

Table 4.2-1: Topics of Interest

■ Accidents and Malfunctions	■ Cumulative Impacts	■ Capacity Funding
■ Community Benefits and Investments	■ Community Services impacts	■ Cultural Preservation
■ Broad Economic Benefits	■ Employment and Training opportunities	■ Environmental Impacts and Mitigations
■ General Consultation and Engagement plans	■ Human Health Risks	■ Indigenous & Treaty Rights impacts
■ Indigenous Economic Inclusion and Equity Partnership	■ Indigenous Project Participation and Involvement	■ Nuclear science education
■ Options Analysis (including comparison to Solar and Wind)	■ Post-Construction Monitoring	■ Power generation (proportion of increased power demand will be provided by the Project)
■ Project Scope, specifically baseline studies	■ Proponent participation in community and on the land	■ Recreation impacts
■ Regulatory Process	■ Relationship to Site C Dam	■ Safety of facility and community
■ Sedimentation in the Peace River	■ Seismic activity including fracking and earthquakes	■ Socio-Economic Impacts
■ Traditionally important species such as Bear, Elk, Fish, Moose, Caribou, Squirrel	■ Traditional Land Use, archaeology and culturally sensitive sites	■ Understandable materials (e.g., Plain Language, translation to Indigenous languages, visual representations)
■ UNDRIP – free, prior and informed consent	■ Waste Management	■ Water including: water use, water volume, impacts to water quality and temperature

5 ONGOING ENGAGEMENT ACTIVITIES

The project team will continue further consultation activities with Indigenous Nations and Communities in the Peace River region, guided by the corporate commitment and approach outlined in this document, as well as to satisfy applicable regulatory requirements, including the Impact Assessment Act, CNSC REGDOC1-1-1 and CNSC REGDOC-3-2-2.

Ongoing and comprehensive engagement will continue through the Impact Assessment and lifecycle of the Project. Engagement activities will be based on each Indigenous Nation or Community's interest and degree of potential impact. Energy Alberta has identified the following activities for this next phase of Indigenous engagement.

- **Circulate notification packages -** In alignment with the IAAC, Energy Alberta will send notification packages to potentially impacted Indigenous Nations and Communities.
- **Introductory meetings -** Energy Alberta will continue to seek introductory meetings with potentially impacted Indigenous Nations and Communities that have not yet met with Energy Alberta. This will be an opportunity to outline the Project, key objectives, deliverables, timelines, and roles and responsibilities of team members, as well as an opportunity to discuss expectations, identify potential challenges, establish communication protocols and answer questions.
- **Confirm engagement preferences and protocols –** Identify preferred methods for ongoing engagement with each Indigenous Nation or Community. These could include, but are not limited to:
  - in-community meetings;
  - visiting Project sites or important community locations;
  - participation in field work and studies;
  - topic-specific technical workshops;
  - plan and undertake appropriate studies (e.g. traditional land use, Indigenous knowledge, cultural heritage, etc.)
  - community dialogue sessions; and
  - sponsorship and/or attendance at Indigenous events.
- **Circulate notifications of regulatory filings and progress through the regulatory process -** Energy Alberta will provide Indigenous Nations and Communities with notification in advance of regulatory filings and to provide updates as the Project progresses through the regulatory processes.

Detailed records of engagement including topics of interest, will continue being maintained as engagement progresses. These records will reflect Energy Alberta's efforts towards incorporation of Indigenous Knowledge and potential mitigation measures and will be provided according to regulatory requirements and applicable stages of the Project. Records of engagement will be provided to Indigenous Nations and Communities for review and validation prior to submission to regulatory agencies.

Appendix B: Initial DFN Comments on Energy Alberta Peace River Nuclear Power Project

MEMORANDUM

To: Tim Robillard: WSP
Ian Anderson: Energy Alberta

From: Matthew General: For Duncan's First Nation

CC: Chief Virginia Glaude: Duncan's First Nation
Councillor Jennifer Testawich: Duncan's First Nation
Councillor Keith Lawrence: Duncan's First Nation
Ken Rich: Director DFN LEED Unit
Andreanne Lawrence DFN LEED Unit
Tom Green: DFN LEED Unit
DFN Elders, Youth and Community Members

Subject: Initial DFN Comments on Energy Alberta Peace River Nuclear Power Project

Date: March 17, 2025

The Duncan's First Nation (DFN) provides this brief document to Energy Alberta in respect to the proposed Peace River Nuclear Power Project**.** This is in follow to the initial formal information presentation and introduction provided on the Project by Energy Alberta in late 2024. As noted, at this time, the DFN takes no official position in respect to the Project neither expressing support no opposition to the Project.

This Project represents a unique and complex undertaking in this region and the DFN will take a cautious and diligent approach to the Project and the DFN, along with other levels of government will need to carefully consider and assess the array of ecological, human health and rights and cultural matters associated with the Project. The DFN will be taking steps to coordinate community meetings with Energy Alberta and the Canadian Nuclear Safety Commission (CNSC) in respect to the Project and is preparing to participate in the review of the Project description and provide an initial set of comments.

1.0 The Duncan's First Nation

In 1899, at Peace River Landing, Duncan Testawich, identified as —Headman of Crees, adhered to Treaty 8 on behalf of —the *'Indians of Peace River Landing and the adjacent territory'*. The Duncan's First Nation is an Indian Band within the meaning of the Indian Act, R.S.C. 1985, c. 1-5 as amended, and is an aboriginal people within the meaning of section 35 of the Constitution Act, 1982 and is the successor (one and the same as) to an aboriginal group adherent to Treaty#8. The DFN community also regards itself as an Indigenous Nation, Government and a People with a distinct culture and way of life which has and continues to be inextricably tied to and dependant on its Traditional Territory, the Peace River Nuclear Energy Project (Project) area and the Host Landscape – the Peace River Valley.

The DFN People have a long-standing history within the north-western region of Alberta and the Peace River region. The use and occupancy of the region by DFN's Ancestors is confirmed by way of DFN's oral traditional knowledge held and passed on by families and the community. The DFN's long term

occupancy of the region and deep cultural connection to their Traditional Territory and the Peace River valley is also confirmed by way of written primary and observations of non-Indigenous explorers, surveyors, traders and Crown officials. Within the last fifteen years, the DFN has with limited funding and opportunity, tabled information, surveys and documents with Crown agencies which confirm the ongoing use, occupancy and utilization of north-western Alberta and Peace River Valley by the DFN People. The DFN's Traditional Territory is depicted on the map at Appendix I.

2.0 The Rights and Territory of the Duncan's First Nation

The DFN's culture and way of life has and continues to be based on its long-standing connection and dependence on its DFN's hunting grounds/Territory. DFN members, families and the community as a whole have depended on the lands, waters, forests and biological diversity within its Traditional Territory to survive, to put food on the table and pass on its culture and identity to coming generations. Since the negotiation of Treaty 8 in 1899, DFN's Traditional Territory has been subjected to successive waves of industrial development and human activity which has brought adverse change to the DFN People. DFN's Territory now plays host to significant levels of agricultural, settlement, transportation, forestry, conventional oil and gas, oil sands, shale gas and liquid, energy foot print and industrial activity and new forms of development such as peat bog harvesting mining. Other forms of development, such as the 'Wonder Valley' AI Data Centre, the Amisk Hydro Project, large inter-basin water transfers/diversions from the Peace River watershed, Small Modular Reactor nuclear projects and the Peace River Nuclear Power Project could also give rise to and further shape subsequent development within DFN's Territory, further deepening the impacts on DFN's rights, culture and way of life.

On top of this, the Territory is also subject to other forms of intense human activity such as recreational hunting, fishing, motorized access and sport. In the face of this overwhelming level of development and adverse change, DFN community members and families continue to try and access their Traditional lands for a range of sustenance, cultural, social, spiritual purposes. Many in the community have not been gainfully employed in the local / regional economy, notwithstanding decades of development and regional prosperity occurring all around them, and must still look to the land to put food on the table to make it though certain times of the year.

The DFN asserts that the scope, level and intensity of anthropogenic development has impacted its Territory, its rights, culture and way of life. For well over a decade, the DFN has reached out to the Government of Alberta (GOA), as the principal party which authorises development and sets land use direction and policy in DFN's Territory, to collaborate with the DFN to assess and address the cumulative impact of development on its rights and People. In 2022, the DFN once again reached out to the GOA and requested the establishment of a cooperative, fair and methodologically defensible process to assess and address the cumulative impact of development on DFN's rights and culture. When the GOA failed to respond in any meaningful or substantive manner, the DFN community and leadership felt it had no other option but to take court action. In the summer of 2022, the DFN instructed JFK Law to bring a legal action against the GOA. (Statement of Claim Package attached). The case is currently in the discovery phase. Within its Statement of Claim, the DFN highlights the possibility of interim legal action where required and warranted.

3.0 The Project

Alberta Energy is proposing the construction of two twin CANDU MONARK (four in total) nuclear reactors, located approximately 30 kilometres north of the Town of Peace River, Alberta. As proposed, the Peace River Nuclear Power Plant Project would cover up to 1,424 hectares in area and provide up to 4800 megawatts of nuclear power in Alberta over an operation period of approximately 80 years. The generated energy, should the project proceed, would be sold to Alberta consumers and industry through

Alberta's electrical grid. The Project's location within the DFN's Traditional Territory and in relation to DFN reserve lands are set out in the maps at Appendix II.

The Project represents the first new ('greenfield') nuclear power plant project to be proposed and constructed since the Bruce Nuclear Power Generating Station constructed in Ontario between 1970 and 1987. The Project would be the first nuclear generating plant to be proposed and constructed in western Canada and Alberta.

An integrated impact assessment for the Project will be conducted jointly by the Impact Assessment Agency of Canada (IAAC) and the Canadian Nuclear Safety Commission (CNSC) subject to the *Impact Assessment Act (IAA)* and the *Nuclear Safety and Control Act (NSCA).* The integrated impact assessment process formally begins with the proponent's submission of its completed Initial Project Description, which describes the Project, its potential environmental effects, and identifies Indigenous Nations and communities who may be affected by the Project. Throughout the integrated impact assessment process, IAAC and CNSC will be conducting oversight and reviews of the proponent's engagement activities with each of the potentially impacted Indigenous Nations and communities.

Over and above the statutory environmental assessment and statutory requirements which currently exist, or that may come into existence under a new government administration, the Crown has common law and constitutional vis a vis Indigenous rights and the rights of the DFN which must be met.

3.0 DFN Objective and Interests in Project Engagement

DFN Objective in Project Engagement

As an Indigenous Government, the DFN will engage with the proponent and the consultation / regulatory avenues made available by government regulators and Crown agencies with the objective of arriving at an informed, fact-based view in relation to the Project and eventually arriving at informed community decision in relation to the Project in parallel with other levels of government.

DFN Interests in Relation to Project Engagement

Among other things, the DFN is interested in working in a constructive manner with Energy Alberta, Crown agencies and regulators to learn, understand, assess and address:

- how the Project's construction and long-term operation could adversely impact our rights, culture and way of life
- what the full nature and scope of the Project's impacts will be on the eco-system which our rights, culture and way of life are predicated upon and depend
- if and how the Project could act in a manner to deepen and reinforce the existing/ongoing cumulative effect/impact of development, which we assert, has resulted in a significant or meaningful diminishment of our rights
- what the impacts on our rights, culture and way of life would from the introduction of a substantially larger local workforce/population who will want to take advantage of recreational opportunities in DFN's Traditional Territory (e.g. hunting, fishing, camping, ATV trail riding and access, back country access etc.) and what government measures could be employed to limit and offset this
- how the introduction of up to 4000MW in energy and generating capacity could give rise to and shape other projects and development trends within DFN's Traditional Territory and or impact DFN's Territory

- what risks does the Project potentially pose to our People's health and safety as well as our neighbouring Indigenous relatives and neighbours and that of local communities

- what unknowns or areas of uncertainty (and areas of diverging scientific and academic views) exist in respect to the safe long-term operation of CANDU nuclear technology / assets

- what risks would the Project potentially pose to our People's health and safety as well as our neighbouring Indigenous relatives and neighbours and that of local communities in the event of an accident, malfunction or catastrophic failure

- what operating system features, redundancies and back systems could be employed (in accordance with regulatory standards and over and above regulatory standards) to reduce the risks to the plant's infrastructure and operations from serious accidents and malfunctions and catastrophic events/failure

- what features, measures and lessons would be employed to avoid/ prevent situations which occurred at the Three Mile Island, Chernobyl and Fukushima incidents and other dangerous scenarios

- what are the risks posed by natural and human induced seismicity in the region to the Project's infrastructure, operation and what mitigation options and strategies might be employed to lower human incidence seismicity in the region and Project area

- how long will high level and inter-mediate nuclear waste be stored in DFN's Territory in and in close proximity to the DFN communities and camps / land use areas based on differing Nuclear Waste Management Organization (NWMO) Deep Geological Repository (DGR) approval, licensing and construction scenarios/timelines (e.g. intermediate, long-term, no approved project)

- If the NWMO DGR is approved, licensed and constructed in northern Ontario, how would high level and inter-mediate nuclear waste be transported from the Peace River site to the east and what measures would be taken to avoid accidents, accidental release and security scenarios of concern

- what are the long-term projections of water quantity and flows in the Peace River watershed and mainstem of the Peace River into the future based on varying climate change projections derived from multiple data sets and analyses (not just that of the Government of Alberta or British Columbia) and will sufficient water supply be available to safely support the plant based on a one-hundred-year operating cycle

- what potential options exists for a co-led or jointly steered project review by Canada, Alberta and interested Indigenous Governments

- what potential options exist for Indigenous led assessment or collaborative assessment of the Project

- how would the principles / provisions of United Nations Declaration on the Rights of Indigenous People (UNDRIP) be embedded, considered and addressed in the assessment and decision-making phases of the Project's review

- if the DFN, other Indigenous Governments and other levels of government's issues and concerns could be addressed in respect to the Project, what type of concrete benefits would accrue (with a high degree of certainty) to interested Nations and communities

- what would the impact of increased workforce/population be on the cost of living for the DFN People and other local communities (e.g. housing, food, services, land availability etc.) and how this uplift in rising costs could be offset

- how would interested DFN People and other local people, who currently don't have the requisite 'high tech' education and skills, be employed in the plant's construction and operation (by the time it comes operational) and what measures and programs could be put in place to ensure a high level of DFN and local community economic participation

- what other vehicles are being discussed and proposed by Energy Alberta and Government of Alberta entities to provide an interest in the Project for Indigenous and local governments

- Other interests to be put forward by the DFN in the course of the Project's review

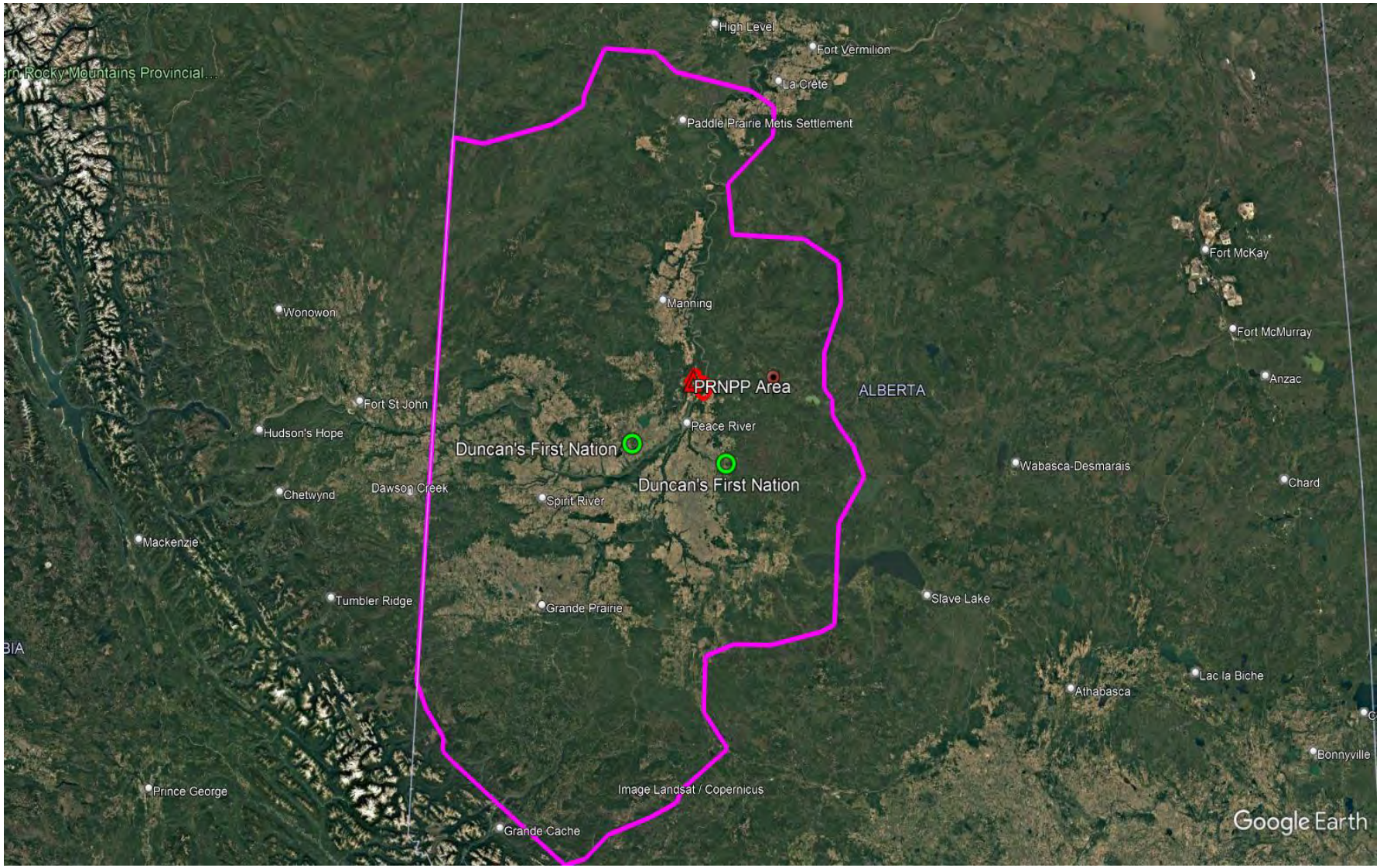
Further communications and information are to follow.

On Behalf of the Duncan's First Nation

<original signed by>

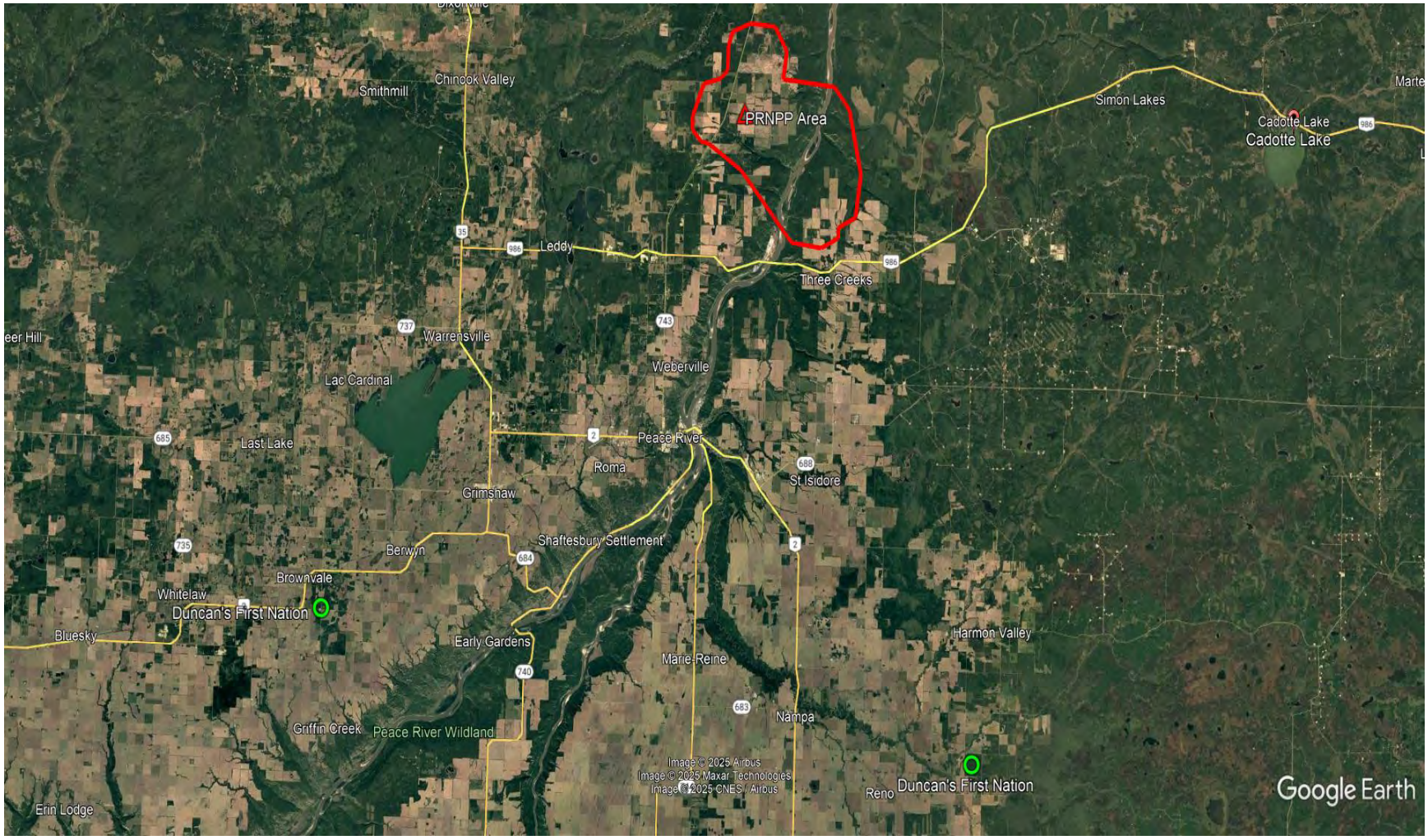
Attachment: DFN Statement of Claim Package

Appendix I



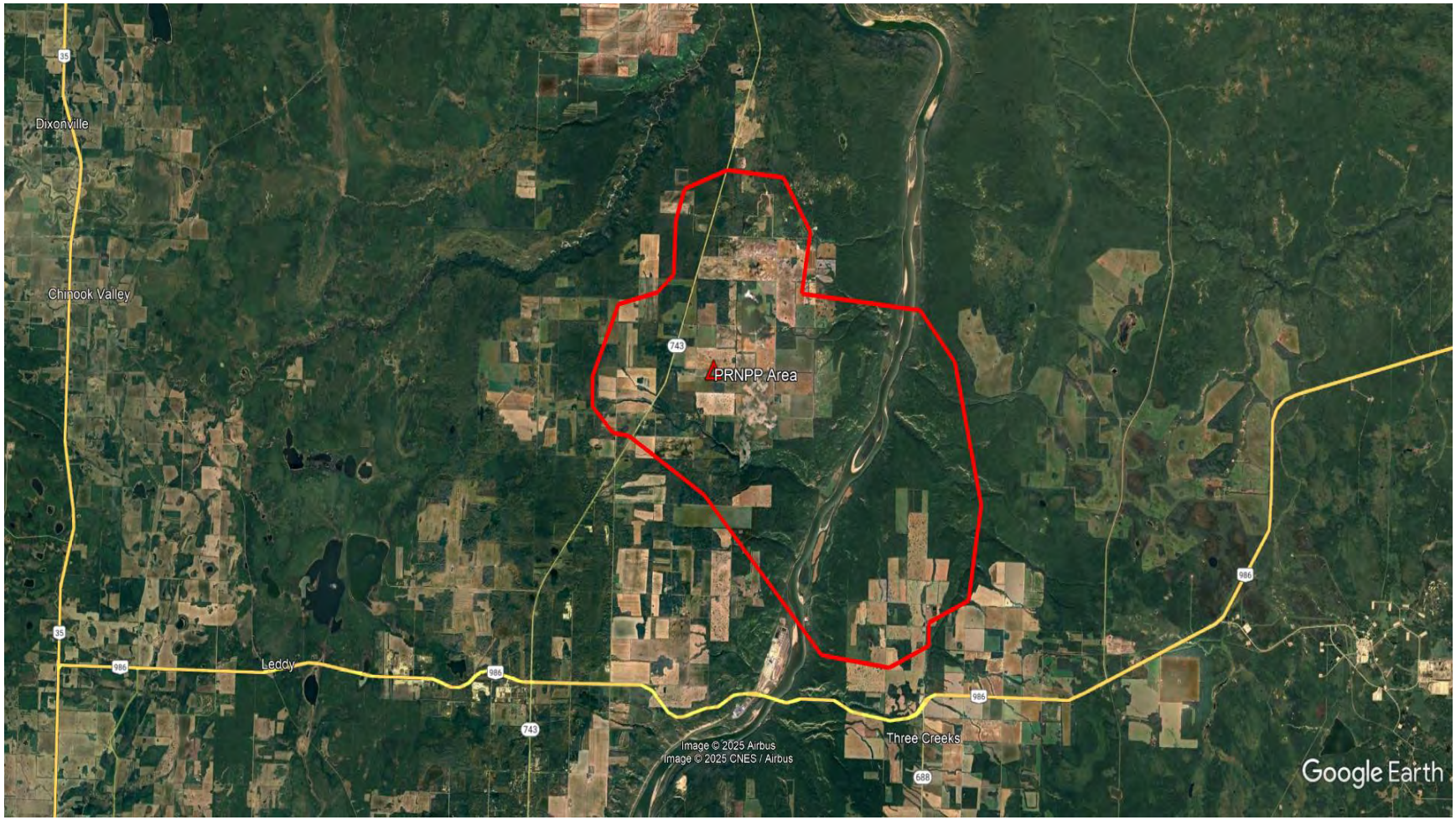
Duncan's First Nation Traditional Territory within Alberta: Approximate
Google Earth Projection: March 2025

Appendix II



Duncan's First Nation Traditional Territory within Alberta and Location Relative to DFN IR Lands: Approximate
Google Earth Projection: March 2025

Appendix II



Alberta Energy Peace River Conceptual Project Development Area (Evaluation of western/eastern site ongoing by proponent)

Appendix C: Project Fact Sheets

ENERGY Alberta

The Land Use Lifecycle of A Nuclear Power Facility

The Peace River Nuclear Power Project

Energy Alberta is proposing to build a world-class nuclear power generating station in the Peace River area of Northern Alberta that would include two to four 1,000MW-class CANDU® MONARK™ reactors. The facility would produce up to 4800MW of electricity to the grid, representing up to 30% of the province's existing electricity generation.

How We Evaluate a Site

Energy Alberta conducted an extensive regional and local site evaluation process to find potential options for the Project. From there, a closer review of the most promising sites is completed to ensure they meet key technical, environmental, social/cultural and safety requirements. The criteria come from a number of sources, including technical essentials in the Canadian Nuclear Safety Commission regulations outlining site suitability evaluation requirements.

Our goal when selecting a site is to:

- Reduce environmental impact by choosing a location that minimizes disruption to the environment.
- Ensure safe operations by selecting a site where environmental factors won't affect the facility's ability to function safely.
- Plan for risk management by identifying any potential security, health or environmental risks and putting strong mitigation strategies in place.

The Site Selection Process Happens in Three Key Phases:

Site Survey.

Exploring potential locations and ruling out any that didn't meet basic requirements.

Environmental, Community & Cultural Impact.

Shortlisting potential sites and carefully assessing and comparing them based on safety and suitability criteria to determine the best options.

Site Evaluation.

Taking a closer look at the chosen sites and analyzing factors that could impact safety and ensuring the location is a good fit for the facility.

What Makes a Good Site for a Nuclear Power Plant?

There are some fundamental considerations in assessing a potential site for a nuclear power plant:

Site Safety.

Assessing the location's natural and physical characteristics might impact the plant, such as earthquakes, surface water flooding risk and meteorological events, as well as addressing the risks associated with potential human-caused incidents.

Environmental, Community & Cultural Impact.

Assessing the potential impact of the plant on the surrounding area, population and environment including historic or culturally sensitive areas and sensitive wildlife or aquatic habitat.

Technical Needs.

Ensuring the site requirements are met such as the need for a supply of water for cooling, access to transportation and transmission infrastructure and reasonable access to skilled labour, equipment and supplies.

More Power, Less Land: The Efficiency of Nuclear Energy

Nuclear power delivers massive amounts of energy while using far less land than other sources, making it one of the most space-efficient ways to generate electricity.

Two 1,000 MW-class CANDU® MONARK™ reactors, along with their main facilities, fit within just 42 hectares (103 acres)—about two-thirds of a quarter section of land or 0.42 km².

That means nuclear power produces far more energy while using far less space—31 times less land than solar and 170 times less than wind!

Site Preparation and Construction: Key Steps in Nuclear Development

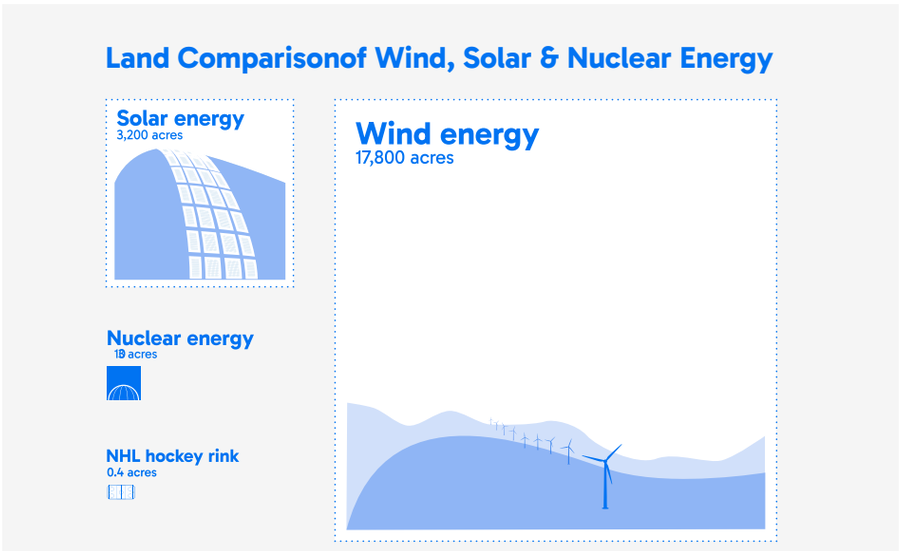
The site preparation phase would be the first step in getting everything ready for construction. This includes building access roads, clearing and leveling the land, as well as setting up essential utilities like power and water. Materials and equipment, including cranes and heavy machinery, are brought in and support facilities like warehouses, storage areas and offices are built to keep everything running smoothly during construction.

The construction phase involves building both the nuclear and non-nuclear infrastructure, including facilities for water intake, storage, treatment, and cooling, as well as waste storage, reactors, control rooms, and support buildings. Other key structures, like communications centers, laboratories, turbine buildings, and electrical stations, are also put in place to ensure everything runs efficiently and safely.

A Responsible Transition: How Nuclear Plants Are Safely Decommissioned

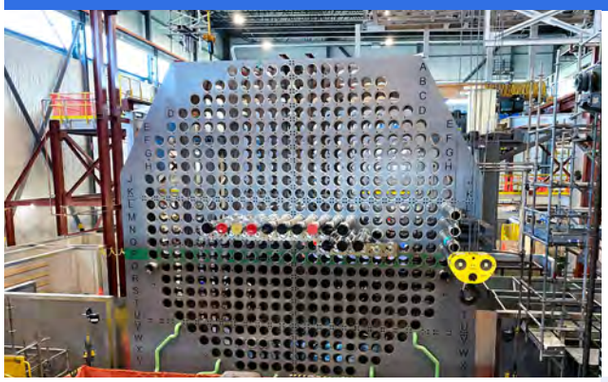
The Canadian Nuclear Safety Commission (CNSC) oversees every stage of a nuclear power plant's life, including its safe decommissioning. Their role is to make sure decommissioning follows strict regulations that protect workers, the public and the environment, while also meeting Canada's international commitments.

Before a nuclear power plant can receive its operating license, the operator must submit a decommissioning plan that details how the plant will eventually be dismantled safely. To ensure these plans are backed by proper funding, a financial guarantee is required, allowing CNSC staff to assess how decommissioning costs will be covered when the time comes.



ENERGY Alberta

Nuclear Energy



Nuclear Energy: A Clean and Reliable Power Source

Energy Alberta is proposing to build a nuclear power generating station in the Peace River area of Northern Alberta that would include two to four 1,000MW CANDU® MONARK™ reactors. The facility could produce up to 4,800MW of electricity to the grid, representing up to 30% of the province's existing electricity generation.

The Advantages of Nuclear

Greening the Power Supply.
Nuclear power is the only readily scalable, zero-emission energy source capable of delivering reliable and affordable electricity around the clock.

Efficient Footprint.
Unlike some renewable energy sources that require large land areas (like wind farms or solar fields), nuclear power plants have a small **physical footprint** for the energy they produce.

Economic Growth and Job Creation.
Canada's nuclear industry is an economic engine, offering high-paying jobs to skilled workers, and significant revenue for provincial and federal governments.

Abundant Supply.
Canada is one of the largest producers of uranium in the world, the fuel used in the production of nuclear energy.

Power Points: Key Facts about Nuclear Energy

Reliable & Consistent.
Nuclear power plants can operate 24/7, 365 days a year, providing a constant and stable source of electricity. It helps ensure that there is always electricity available, even when the sun isn't shining or the wind isn't blowing.

Zero Emissions.
Nuclear energy produces **virtually zero greenhouse gas emissions** during operation, making it one of the cleanest sources of energy. It plays a critical role in reducing carbon footprints and combating climate change.

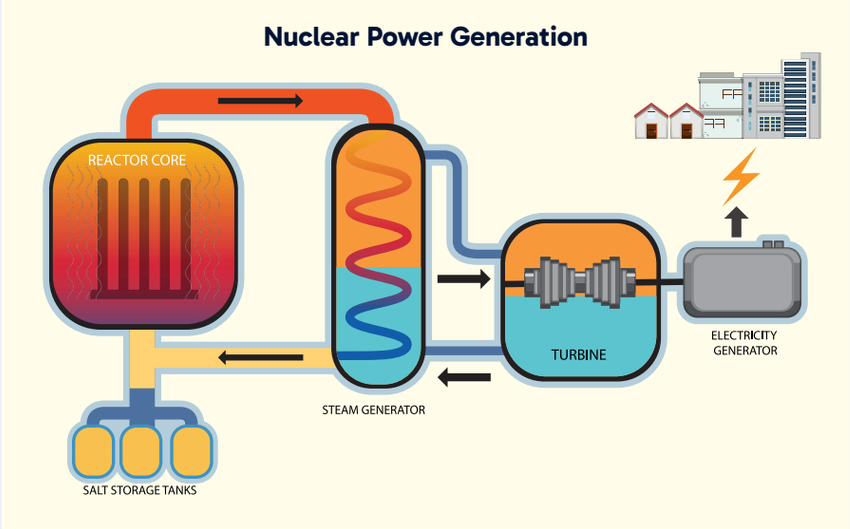
High Energy Density.
A small amount of nuclear fuel can generate a tremendous amount of energy. For example, a single uranium fuel pellet is about the size of a sugar cube and can produce the same energy as 907 kg of coal, 564 litres of oil, or 480 cubic metres of natural gas.

Energy Security.
In an increasingly volatile global energy market, nuclear power offers a path to energy independence. CANDU® reactors use natural uranium mined and processed in Canada providing lower costs and a stable, secure energy supply which is essential for the growth and development of communities.

Robust Safety Systems.
Modern nuclear reactors are equipped with advanced safety systems that make them incredibly safe. The industry is one of the most regulated in the world and facilities are inspected regularly to ensure they meet or exceed strict safety standards established by the Canadian Nuclear Safety Commission and adhere to global safety recommendations set by the International Atomic Energy Agency (IAEA).

The Science of Nuclear Power

Nuclear energy is the energy released from the nucleus (core) of atoms, primarily through a process known as **nuclear fission.** Fission is a reaction that occurs when atoms of uranium or plutonium are split into two or more smaller nuclei. The process releases large amounts of energy in the form of heat, which is converted into electricity by creating steam in a nuclear power plant.



How Does a Nuclear Power Plant Work?

Nuclear Fission.

The process begins in the reactor, where uranium atoms are split by neutrons. This releases a significant amount of heat.

Steam Generation.

The heat produced by fission turns water into steam.

Turbine Rotation.

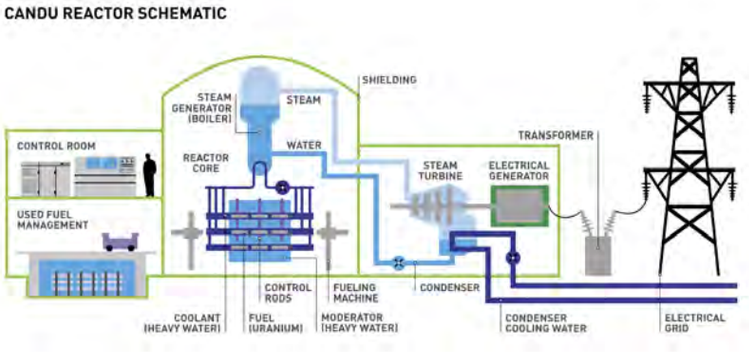
The steam spins a turbine connected to a generator, which produces electricity.

Cooling.

After passing through the turbine, the steam is cooled and returned to water, which is then heated again to repeat the cycle. The cooling water used in this process is kept separate from the steam cycle and does not come into contact with the reactor core.

Waste Management.

All of Canada's used nuclear fuel is safely managed at licensed storage facilities.

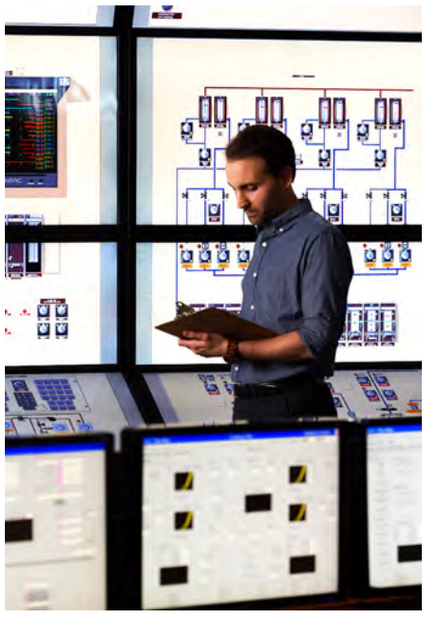


Graphic Source: Canadian Nuclear Association

Fueling the Future

Canada has been producing nuclear energy since the 1960s. A reactor needs 10 uranium pellets to power a house for a year. Each pellet weighs about 20g, less than a AA battery.

Generating the same amount of electricity as one uranium pellet would require 410 litres of oil. A typical generator supplying power for one million people will produce about three cubic metres of waste per year.



ENERGY Alberta

Peace River Nuclear Power Project

Powering Alberta's Clean Energy Future

Alberta has the opportunity to lead in clean energy innovation.

Nuclear energy offers a zero-emission source of electricity, ensuring a reliable supply and stable pricing. By leveraging this technology, we can create a made-in-Alberta solution to secure long-term energy stability while advancing both our environmental and economic objectives.

Project Overview

Utilizing Canada's proven nuclear technology.

Energy Alberta is proposing to build a nuclear power generating station in the Peace River area of Northern Alberta that would include two to four 1,000MW CANDU® MONARK™ reactors. The facility could produce up to 4800MW of electricity to the grid, representing up to 30% of the province's existing electricity generation.

Project Status

Phase 1: Bringing Expertise Together

Energy Alberta has assembled a team with extensive nuclear experience and initiated the planning required to advance a nuclear generation project in Canada, including early consultations with government, community leaders and Indigenous groups.

Phase 2: Impact Assessment Process

Energy Alberta plans to submit an Initial Project Description in 2025 that will initiate a federal Impact Assessment (IA) for the Peace River Nuclear Power Project.

The IA process is led by the Impact Assessment Agency of Canada (IAAC) and the Canadian Nuclear Safety Commission (CNSC), and will evaluate the potential effects of the project on the environment, health, society and economy. It will also assess the impact on Indigenous peoples and their rights.

Phase 3: Decision on Public Interest

An IA is a phased planning process spanning over multiple years, involving extensive community and public engagement, as well as comprehensive environmental and socioeconomic studies. Upon completion of the IA process, the federal government determines whether the project is in the public interest and grants approval for it to proceed.

The Advantages of Nuclear

Harnessing the power of innovation.

Canada's nuclear industry is an economic engine, offering high-paying jobs to skilled workers, and significant revenue for provincial and federal governments.

Jobs
89,000 people employed.

Revenue
$22 billion in annual GDP contribution.

Output
15% of Canada's electricity.

Environmental Advantage
80 million tonnes of CO_2 emissions per year are avoided.

Energy Security
Nuclear Energy runs 24/7, 365 days a year.

Supply
Canada is the second largest uranium producer in the world.

CANDU: A Canadian Success Story

65 years of safe operations.

Canada's nuclear industry is one of the most regulated in the world and its facilities are the most protected critical infrastructure in Canada.

Operating Excellence
CANDU® reactors have amassed more than 900 years of safe operating experience in seven countries around the world.

Canadian Success
There are 19 operating CANDU® reactors in Canada - 18 in Ontario and one in New Brunswick.

Global Presence
Canada has exported CANDU® technology around the world with 30 reactors in operation globally. As well, India operates 16 reactors that are based on the CANDU® design.

Energy Alberta

Greening the power supply.

Energy Alberta an Alberta-based company led by an experienced group of innovators, nuclear industry experts and leaders in environmental sustainability. We are dedicated to building and operating a world-class nuclear electricity generating station that will transform energy production in the province. Founded in 2005, our vision is to diversify Alberta's energy portfolio by providing safe, secure energy for Albertans while creating high-quality jobs and economic opportunities.

Radiation Safety

Radiation Safety

Canada has been producing nuclear energy since the early 1960s. Nuclear power plants in Canada are subject to strict health and safety regulations and are routinely inspected to ensure they meet or exceed rigorous safety and environmental standards established by the Canadian Nuclear Safety Commission and international organizations.

Protecting People and the Environment

Canada's nuclear industry is subject to some of the strictest radiation safety standards in the world. The Canadian Nuclear Safety Commission regulates the life cycle of nuclear plants and has a team of technical experts and onsite inspectors to maintain rigorous oversight of plant operation. Nuclear power plants adhere to rigid radiation protection regulations under the Nuclear Safety Control Act, as well as recommendations from international organizations such as the International Atomic Energy Agency (IAEA) that provide global safety standards for radiation exposure.

Minimizing radiation releases.

Nuclear power plants have control and safety systems in place to minimize radiation releases. During normal operations, they release very small amounts of radiation into the air and water. These releases come from the reactor and its system and from waste management activities.

In order to reduce airborne releases, highly efficient filters and radiation monitors are installed as part of the ventilation systems. Filters remove more than 99% of the radiation from the air before it is released to the environment.

Used Nuclear Fuel.

After nuclear fuel has been used in a reactor, it is removed and stored securely in a water-filled pool for a period of 7 to 10 years. The water in the pool continues to cool the fuel and provides shielding against radiation. All of Canada's fuel pools are built in ground, in separate buildings at the nuclear power plant, and are designed to withstand earthquakes.

After 7-10 years, the bundles are placed in dry storage containers, silos or vaults. After 50 years, the life of the container could be extended, or the used fuel could be repackaged. The Nuclear Waste Management Organization has announced their selection of the Wabigoon Lake Ojibway Nation-Ignace area in Ontario as the site for Canada's deep geological repository for used nuclear fuel. Learn more at nwmo.ca.

Safety Measures in Canadian Nuclear Plants

Canadian nuclear power plants are equipped with multiple, independent **robust control and safety systems** designed to prevent accidents and mitigate the effects should an accident occur. The systems perform three fundamental safety functions: controlling the reactor, cooling the fuel and containing radiation.

Containment Structures.

These are thick concrete walls designed to isolate the radioactive materials inside the reactor. Even in the unlikely event of an accident, the containment structures are built to prevent radiation from spreading.

Radiation Shielding.

Materials such as water, concrete and lead are used to absorb radiation and protect workers and the surrounding environment.

Monitoring Systems.

Continuous radiation monitoring systems are in place inside and outside the plant. These systems ensure that radiation levels remain within strict safety limits, both for plant workers and the nearby community.

A Safe and Sustainable Future

Nuclear power is one of Canada's safest and cleanest energy sources and offers one of the best ways to meet Alberta's constant and growing electricity demands.

Reliable & Consistent.

Nuclear power plants can operate 24/7, 365 days a year, providing a constant, stable and affordable source of electricity that is readily scalable.

Zero Emissions.

Nuclear energy produces virtually zero greenhouse gas emissions during operation, making it a critical tool in combating climate change.

Energy Security.

In an increasingly volatile global energy market, nuclear power offers a path to energy independence by reducing reliance on imported fossil fuels.

Understanding Radiation

We are exposed to natural and man-made sources of radiation in our daily lives every day. Radiation is energy that travels through space in the form of electromagnetic waves or particles.

Ionizing Radiation.

This type of radiation has enough energy to break an electron away from an atom causing that it to become charged. It is the type produced by nuclear power plants and x-ray machines.

Non-Ionizing Radiation.

This type, such as visible light or radio waves, does not have enough energy to affect atomic structure. It is the type produced by microwaves and Wi-Fi.

Naturally Occurring Radiation.

Radioactive elements like potassium-40 and carbon-14 are a part of the world around us. Potassium-40 is present in the foods we eat, like bananas and potatoes. Carbon-14 is found in the atmosphere and makes its way into us through the food chain.

Ionizing radiation is produced during nuclear fission, the process that powers nuclear reactors. The use of nuclear power in clean energy production is tightly regulated and monitored to ensure the highest standards of public and environmental safety.

Workers in a nuclear power plant are exposed to far less radiation than what you'd experience from a single medical X-ray. Stringent safety protocols, advanced shielding and state-of-the-art monitoring ensure that radiation exposure for plant workers remains extremely low – often comparable to the natural background radiation we're all exposed to daily.

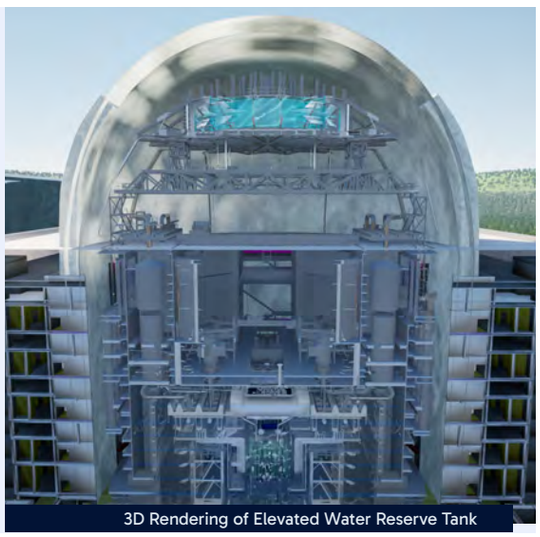
Nuclear Safety

Protecting What Matters: Energy Alberta's Commitment to Safety

Energy Alberta is deeply committed to protecting the water, air, land and people around our proposed project. Safety is not just a priority— it is at the core of our values. The use of nuclear power in clean energy production is tightly regulated and monitored to ensure the highest standards of public and environmental safety.

A Legacy of Robust Safety Standards

Canada is a global leader in nuclear safety and has a long history of safe nuclear energy production dating back to the 1960s. The Canadian Nuclear Safety Commission (CNSC) oversees the life cycle of nuclear plants, with technical experts and on-site inspectors monitoring plant operations to ensure compliance with rigorous safety and environmental standards. With stringent regulation at the national and international levels, including oversight from the United Nations' International Atomic Energy Agency (IAEA), nuclear power generation is one of the safest energy technologies.



3D Rendering of Elevated Water Reserve Tank

Multiple Layers of Protection: Safety of the CANDU® technology

The safety of workers and nearby communities will be our utmost priority. Canadian nuclear power plants are equipped with robust, independent control systems that ensure safety at all stages of operation. In addition, other systems are designed to perform three fundamental safety functions:

Containment Structures.

Thick concrete walls isolate radioactive materials inside the reactor. In the unlikely event of an incident, these structures prevent radiation from spreading.

Radiation Shielding.

Materials such as water, concrete and lead absorb radiation, ensuring the safety of both workers and the surrounding environment.

Continuous Monitoring.

Radiation levels are continuously monitored both inside and outside the plant. This ensures that radiation exposure remains within the strictest safety limits.

Safe Radiation Practices: Keeping Workers and Communities Safe

Radiation is a natural part of life. We are exposed on a daily basis to radioactive elements like potassium-40 and carbon-14. Radiation exposures from an operating nuclear power plant are very low. A person who lives near a plant could receive a radiation dose that is at least 1,000 times lower than the dose from natural background sources radiation and plant workers are exposed to far less radiation than the average person experiences from a single medical X-ray.

Nuclear power plants are equipped with advanced control and safety systems, as well as highly efficient filters and radiation monitors, designed to minimize any radiation releases. These filters remove more than 99% of radiation from the air before it is released into the environment, ensuring that the public and local ecosystems are protected.

Site Safety and Security

Canada's nuclear facilities are the most protected critical infrastructure in Canada.

Nuclear security is regulated by the CNSC, which sets out detailed security requirements designed to safeguard nuclear facilities against threats, including cyber security, and ensure that nuclear material stays in the right hands. Though security measures have been developed over time in response to potential threats, a breach of the physical, personnel or information security of Canadian nuclear facilities has never happened.

Managing Used Nuclear Fuel: Safe Storage and Disposal

One of the most critical aspects of nuclear safety is the handling of used nuclear fuel. After fuel is used in a reactor, it is removed and stored securely in a water-filled pool for 7 to 10 years. This process allows the water to continue cooling the fuel and providing necessary radiation shielding. The pools are built in-ground, designed to withstand earthquakes, and are located in separate buildings on-site to ensure safety.

Once the fuel has sufficiently cooled, it is moved to dry storage containers or vaults. These storage systems are carefully monitored to ensure that the fuel remains safely contained.

Lessons Learned and Safety Advances

No industry is immune from accidents, but all industries learn from them. With nuclear power, the potential hazards have been factored into the design of nuclear power plants in order to protect the public, the environment and workers.

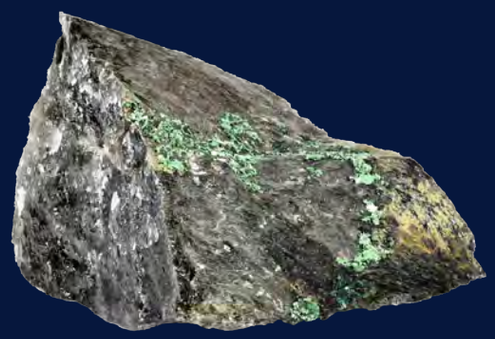
Modern-day facilities contain numerous safety improvements based on operational experience. In addition to engineering and procedures which significantly reduce the risk and severity of incidents, all plants have guidelines for accident management and mitigation.

Emergency Management

Although nuclear accidents are very rare, it is still important to prepare should one occur. The Canadian Nuclear Safety Commission (CNSC) mandates that all major nuclear facilities maintain comprehensive emergency preparedness programs, including dedicated response facilities, specialized equipment and trained personnel. The CNSC requires all nuclear facilities to conduct regular tests of their emergency management systems and response organizations.

In the unlikely event of an incident, facility staff along with trained and enabled emergency response personnel are prepared to respond quickly, safely and effectively in line with the strict planning, training and testing programs governed by the CNSC. CNSC staff with extensive experience and expertise in nuclear emergency response would oversee the response to ensure that appropriate actions are taken to limit the risk to health, safety, security and the environment.

Lifecycle of Uranium: From Earth to Energy



Uranium is a heavy metal and one of many naturally occurring radioactive elements. It is one of the most common elements in Earth's crust - 40 times more common than silver and 500 times more common than gold. It can be found almost everywhere in rock, soil, rivers and oceans.

Did you know?

CANDU® reactors use natural uranium as their nuclear fuel. Natural uranium is composed of about 0.7% uranium-235, and the remaining 99.3% is mostly uranium-238 which cannot directly be used in a fission process to obtain energy. Unlike other reactors, CANDU® technology makes more efficient use of uranium, needing 25-30% less mined fuel than light water reactors.

Transforming Uranium: How CANDU® Reactor Fuel is Made

Canada has been a global leader in nuclear energy research, technology and development for 65 years. Nuclear energy is one of Canada's safest and cleanest energy sources and is recognized globally as a critical tool in reducing greenhouse gases and fighting climate change.

The Uranium Conversion Process:

Mining.

Uranium ore is removed from the earth using three main methods: open-pit mining, underground mining, or in-situ recovery.

Refining.

Chemical processes remove impurities, refining uranium oxide into high-purity uranium trioxide.

Milling.

The ore is crushed, ground into a slurry, and leached with acid to extract and purify uranium, producing uranium oxide powder.

Conversion.

Uranium trioxide is converted to uranium dioxide.

Fuel Manufacturing.

Uranium dioxide powder is pressed into small pellets, baked at high temperatures for strength and precision, and then loaded into fuel tubes. These tubes are assembled into bundles, ready to power a nuclear reactor.

Power Point

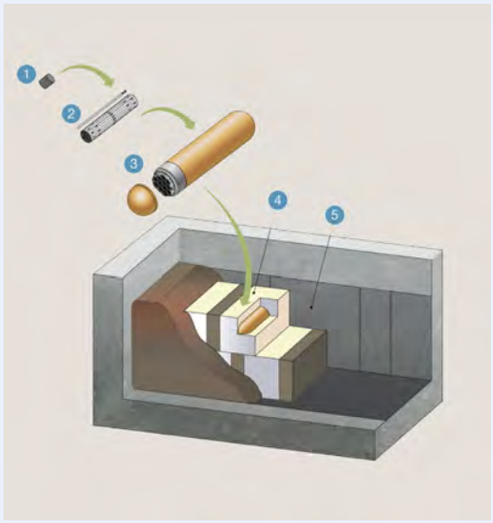
Each bundle is the size of a fireplace log and provides enough electricity for 100 homes for 18 months.

Source: Nuclear Waste Management Organization

A Safe Approach to Managing Fuel

Used nuclear fuel is a byproduct of nuclear power and it must be safely managed long-term. Although its radioactivity level decreases rapidly with time, the used fuel must be contained and isolated from people and the environment, essentially indefinitely. Canada follows proven practices used globally and used fuel is first stored on-site in pools, then in dry storage using concrete cannisters before being sent to long-term disposal.

Once a used nuclear fuel bundle is removed from a reactor, it is placed in a water-filled pool where its heat and radioactivity decrease over time. After seven to 10 years, the bundle is placed in a dry storage container, a method that has been in use worldwide since the 1980s.



Source: Nuclear Waste Management Organization

Canada's Long-Term Plan

Safe, long-term management of used nuclear fuel.

The Nuclear Waste Management Organization (NWMO) is the not-for-profit organization tasked with the safe, long-term management of Canada's used nuclear fuel in a manner that protects people and the environment for generations to come. The technical method will involve building a deep geological repository in a suitable rock formation to safely contain and isolate used nuclear fuel using a multiple-barrier system. NWMO selected Wabigoon Lake Ojibway Nation and the Township of Ignace in Ontario as the host communities for the future repository site. Learn more at nwmo.ca.

Powering the World: Canada's Uranium Industry

Canada is the world's second largest producer of uranium, accounting for roughly 13% of total global output. The mining and milling of uranium is an $800-million-a-year industry that directly employs over 2,000 Canadians at the mine sites. Most Canadian uranium is mined and milled in northern Saskatchewan, in the Athabasca Basin region.

Uranium fuels nuclear power plants worldwide – currently, nearly 85% of Canada's uranium production is exported. In 2018, Canada exported approximately $600 million in uranium, with major shipments going to the United States, Europe and Asia. The remainder is used to fuel CANDU® reactors in Canada, which generates about 15% of our country's electricity. Of the 19 operating CANDU® reactors in Canada, 18 are located in Ontario and one is in New Brunswick.

The Power of Uranium

Nuclear fission is very energy-dense, so a nuclear reactor requires very little fuel. A reactor needs 10 uranium pellets to power a house for a year. Each pellet weighs about 20g, less than a AA battery.

Generating the same amount of electricity as one uranium pellet would require 410 litres of oil or 400 kg of coal. A typical generator supplying power for one million people will produce about three cubic metres of waste per year.

Source: Cameco

ENERGY Alberta

Waste Management

Commitment to Safety: Understanding Nuclear Waste Management

Canada has been a global leader in nuclear energy research, technology and development for 65 years. Nuclear energy is one of Canada's safest and cleanest energy sources and is recognized globally as a critical tool in reducing greenhouse gases and fighting climate change.

In Canada, the Canadian Nuclear Safety Commission rigorously oversees every stage of nuclear waste management, from handling and transport to storage and final disposal.

Power Points: What You Need to Know About Used Nuclear Fuel

Radioactivity decreases over time.

With modern containment strategies, risks are minimized while technology continues to improve long-term storage solutions.

Properly managed waste does not pose immediate threats.

Safety protocols and containment measures are strictly followed to protect people and the environment.

Tailored solutions.

Each type of waste requires specific management techniques, ensuring tailored solutions that align with its unique characteristics.

Source: Nuclear Waste Management Organization.

What is Used Nuclear Fuel?

Used nuclear fuel is a byproduct of nuclear power and it must be safely managed long-term. Although its radioactivity level decreases rapidly with time, the used fuel must be contained and isolated from people and the environment, essentially indefinitely.

Canada follows proven practices used globally and used fuel is first stored on-site in pools, then in dry storage using concrete cannisters before being sent to long-term disposal.

Once a used nuclear fuel bundle is removed from a reactor, it is placed in a water-filled pool where its heat and radioactivity decrease over time. After seven to 10 years, the bundle is placed in a dry storage container, a method that has been in use worldwide since the 1980s.

A Safe Approach to Managing Waste

Energy Alberta is committed to the safe disposal of nuclear waste using proven technology to mitigate any potential risks associated with the management and storage of nuclear waste. Our facility would adhere to the robust regulations and best practices set by the Canadian Nuclear Safety Commission and international regulators to ensure all forms of conventional and nuclear waste are handled in a safe, secure and responsible manner.

Canada's Long-Term Plan

Safe, long-term management of used nuclear fuel.

The Nuclear Waste Management Organization (NWMO) is the not-for-profit organization tasked with the safe, long-term management of Canada's used nuclear fuel in a manner that protects people and the environment for generations to come. The technical method will involve building a deep geological repository in a suitable rock formation to safely contain and isolate used nuclear fuel using a multiple-barrier system. NWMO selected Wabigoon Lake Ojibway Nation and the Township of Ignace in Ontario as the host communities for the future repository site. Learn more at nwmo.ca.

Source: Nuclear Waste Management Organization.

Types of Nuclear Waste

65 years of safe operations

Canada's nuclear industry is one of the most regulated in the world and its facilities are the most protected critical infrastructure in Canada. All nuclear waste is safely managed in compliance with stringent regulations and in accordance with international standards.

Low-Level Waste.

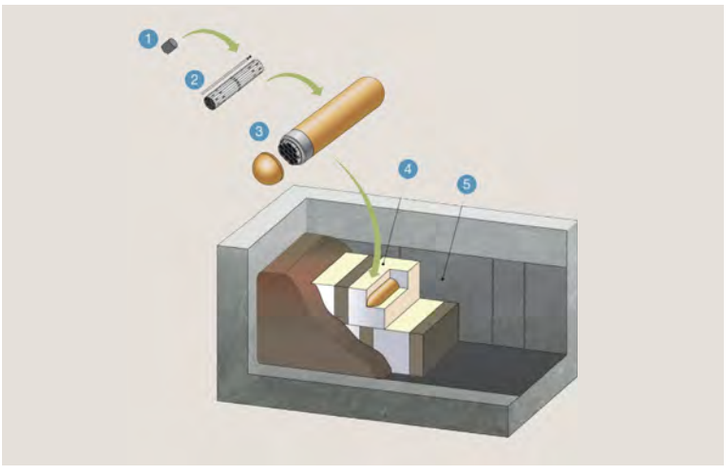
These materials can be handled with minimal protective measures and include items such as used protective clothing, tools and lab waste.

Intermediate-Level Waste.

These materials require shielding during handling and include items such as reactor components, resins from water treatment and certain chemicals.

High-Level Waste.

These materials require robust containment, cooling measures and long-term management and include items such as spent nuclear fuel and reactor components, such as control rods and piping.

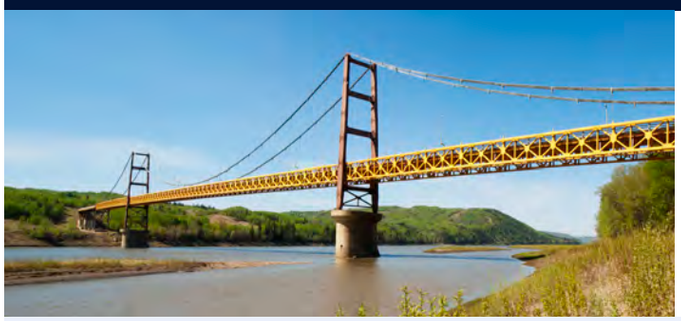


The Peace River Nuclear Power Project

Utilizing Canada's proven nuclear technology.

Energy Alberta is an Alberta-based company led by an experienced group of innovators, nuclear industry experts and leaders in environmental sustainability. We are proposing to build a world-class nuclear power generating station in the Peace River area of Northern Alberta that would include two to four 1,000MW-class CANDU® MONARK™ reactors. The facility could produce up to 4800MW of electricity to the grid, representing up to 30% of the province's existing electricity generation.

Water Use



Protecting Water Resources

Energy Alberta cares deeply about environmental stewardship and promoting sustainable water management practices to minimize the impact of its proposed operations on local water resources and protect the Peace River watershed.

Energy Alberta's Commitment to Water Management

Energy Alberta is proposing to build a nuclear power generating station on the shoreline of the Peace River, one of the largest rivers in Alberta. The Project would involve withdrawing water from the Peace River to use for cooling and other processes required for safe operations. Advanced technology will be utilized to recycle the cooling water and reduce the amount of water needed. The water management process in nuclear power plants is highly regulated, including permits and mitigation requirements put in place by local, provincial and federal governing bodies to ensure effective conservation and stewardship. Significant efforts are undertaken to protect the habitat of the local watershed, including rigorous environmental programs that monitor, track and analyze surrounding ecosystems to safeguard the health of people and the environment.

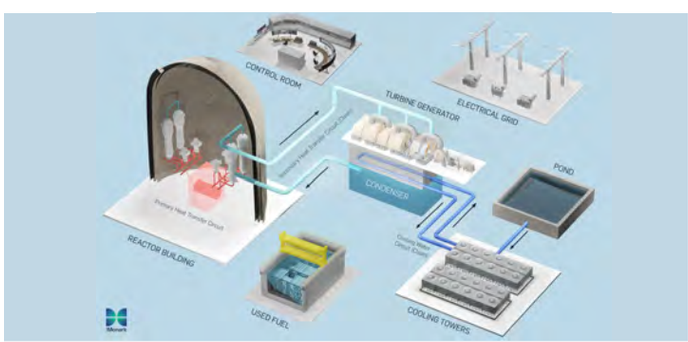
Water Act Licence: A licence under the Water Act is required to divert and use surface or groundwater in Alberta for a specified purpose such as irrigation, a municipal water system or energy production. A licence identifies the water source as well as the location of the diversion site, quantity, rate, and timing of withdrawal as well as the conditions of the licence. Energy Alberta is currently studying the area of the Peace River that would require the withdrawal of water for the Project as the initial step in the process to apply to the Government of Alberta for a water licence.

Understanding the Water Cooling System

A consistent supply of water from the Peace River, primarily used for cooling, will be an integral part of the Peace River Nuclear Power project. The volume of water required will be determined as technical and project details are refined.

There are three separate circuits that make up the main features of how water is used when generating electricity in a CANDU® nuclear reactor. First, the heat transfer system in a CANDU® nuclear reactor works by circulating heavy water (known as D2O) through the reactor core to transfer the heat generated by the fission process to the steam generator. A separate water circuit is used in the steam generator where the heat from the reactor causes the circulating water to turn into steam. This steam is then transferred to a series of turbines that convert the energy from the steam into electricity.

Once the steam has been used to create electricity, the left over heat must be removed and the steam converted back to water that can be heated up again to produce more electricity. This is done by a third water system called the cooling water circuit. This third water circuit is where the majority of the water needed by the power plant is used. The water in all three of these systems is kept separate and no mixing occurs. The movement of heat energy is across the walls of the pipes that contain the water in each circuit.



3D Rendering of Elevated Water Reserve Tank

Cooling Water Infrastructure

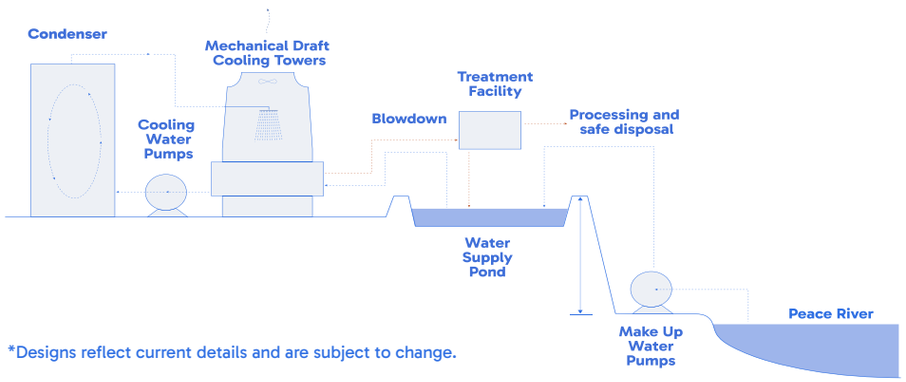
The proposed project plans to utilize a mechanical draft cooling system to remove the left over heat from the steam circulating through the turbine system after the electricity is generated. This method allows less water to be pumped from the river and prevents heated water being released back into the Peace River. Instead, the water is evaporated, or consumed, in the heat removal process.

Key components of the plant's cooling water infrastructure include:

• Water intake, pipeline and access road to the river.

• Water storage ponds to hold a reserve of water for power production if the amount of water coming from the river is reduced because of ice conditions or low water levels.

• Mechanical draft cooling towers which use fans to move all the air required to transfer heat from the steam driving the turbines to the air. Water is consumed and evaporated as a result of the warm circulating water interacting with relatively dry and cool air.



*Designs reflect current details and are subject to change.

A Safe and Sustainable Future

Nuclear power is one of Canada's safest and cleanest energy sources and offers one of the best ways to meet Alberta's constant and growing electricity demands.

Reliable & Consistent.

Nuclear power plants can operate 24/7, 365 days a year, providing a constant, stable and affordable source of electricity that is readily scalable.

Zero Emissions.

Nuclear energy produces virtually zero greenhouse gas emissions during operation, making it a critical tool in combating climate change.

Energy Security.

In an increasingly volatile global energy market, nuclear power offers a path to energy independence by reducing reliance on imported fossil fuels.

Appendix D: Poster Boards

ENERGY
Alberta

Welcome to the

Peace River Nuclear Power Project

Open House

A Made-In-Canada Solution

About Energy Alberta

Energy Alberta is an Alberta-based company, founded in 2005, with a dedicated and experienced group of innovators, nuclear industry experts and leaders in environmental sustainability.

We want to utilize our country's proven nuclear technology to supply steady, sustainable and affordable electricity for the province.

Energy Alberta has assembled a team with extensive nuclear experience and initiated the planning required to advance a nuclear generation project in Canada, including early consultations with Indigenous communities, government, regulators and public stakeholders.

AtkinsRéalis

TORYS LLP

wsp

RBC

ENERGY Alberta

Project Overview

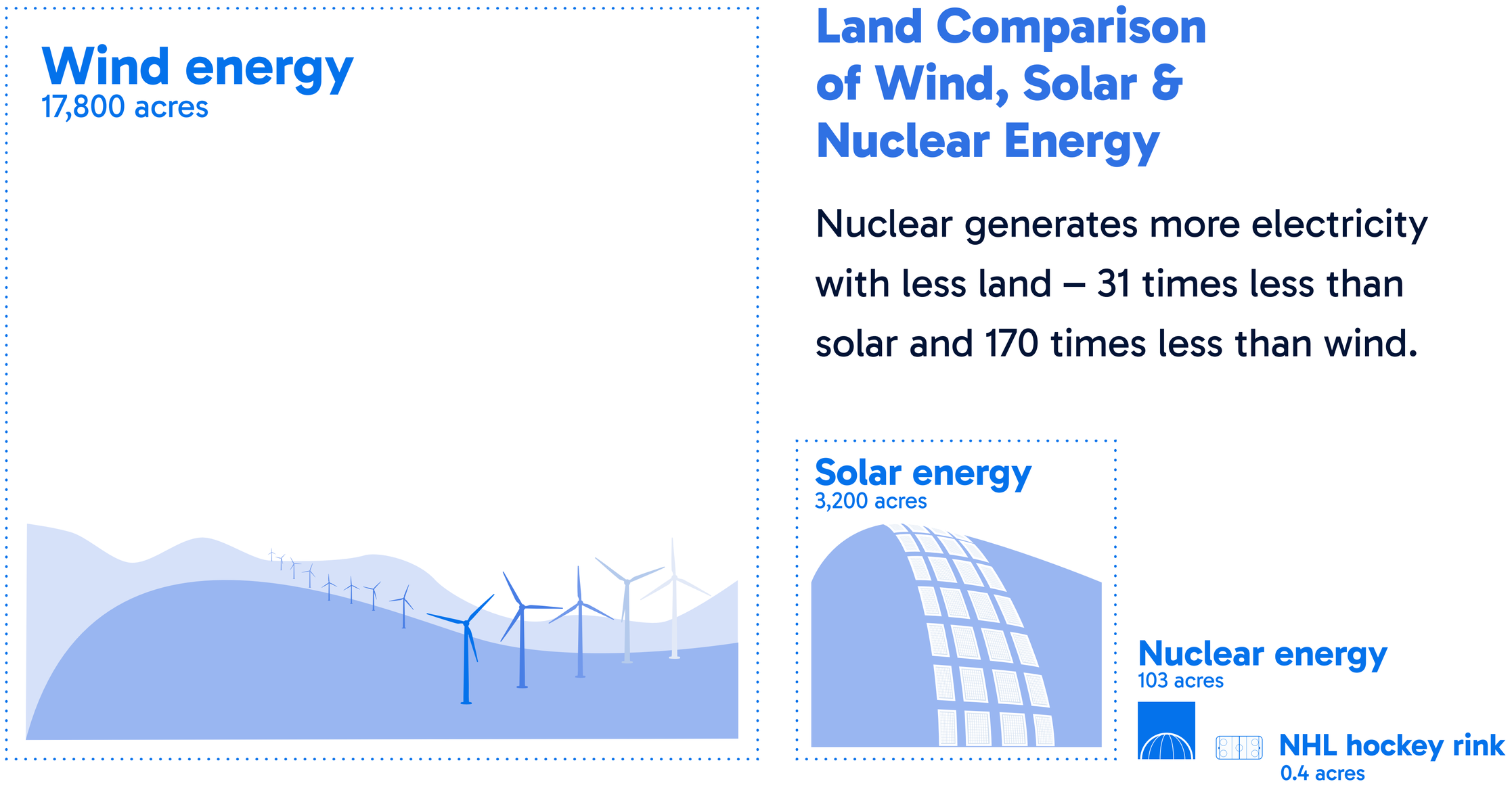
- Permitting 4800 Megawatts (MW) of nuclear power.
- Building two to four safe, reliable and zero-emission 1,000 MW-class CANDU® MONARK™ reactors north of Peace River.
- Energy Alberta is currently in the early development stages of the Project and initial engagement with local and Indigenous communities has begun and will continue through the regulatory, construction and operation stages of the Project.

How big will the facility be?

Reactors and main site facilities span approximately 42 hectares - about 2/3 of a quarter section of land (103 acres) or 0.42 km².

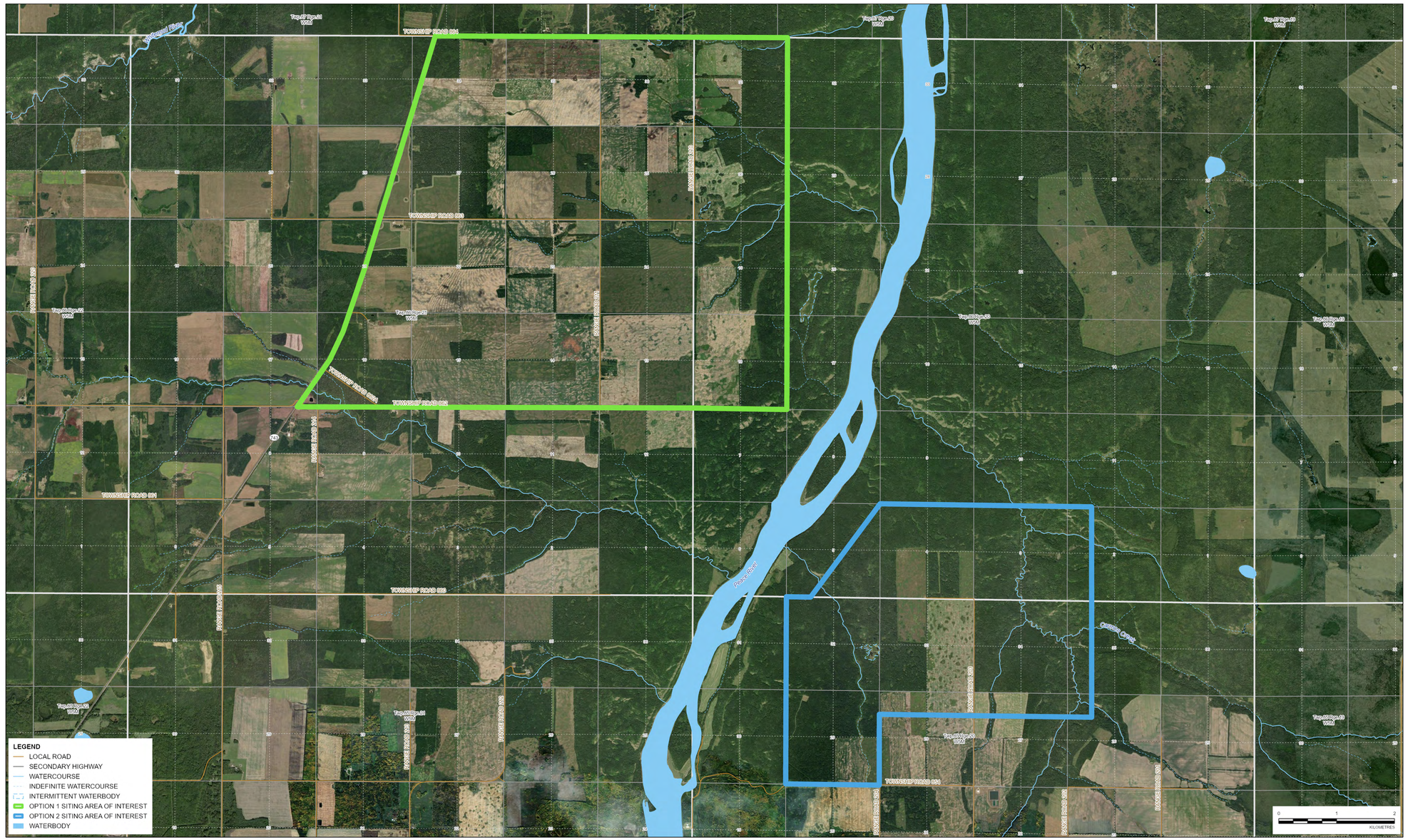
Land Comparison of Wind, Solar & Nuclear Energy

Nuclear generates more electricity with less land – 31 times less than solar and 170 times less than wind.



ENERGY Alberta

Project Area Options



ENERGY Alberta

Site Evaluation Process

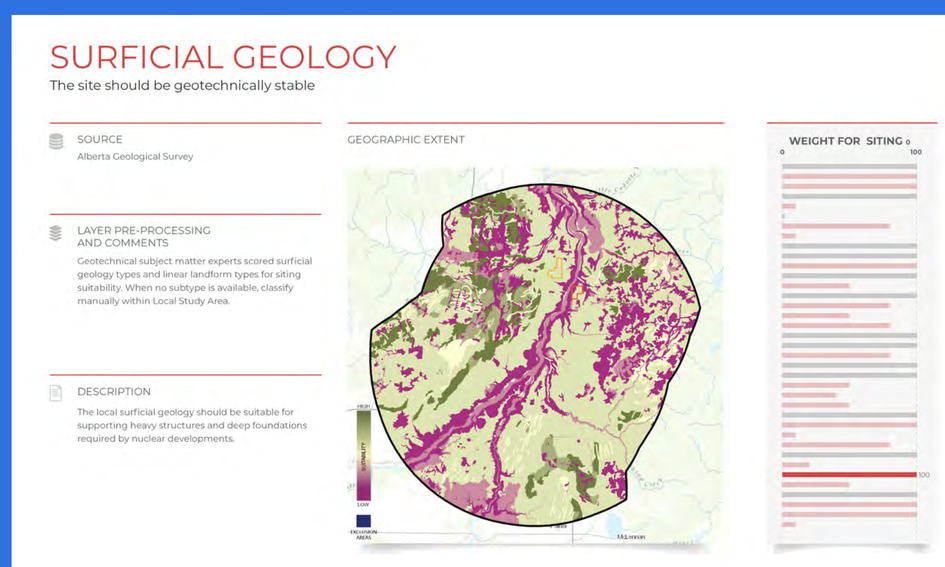
- Energy Alberta conducted an extensive regional and local site evaluation for the proposed site options with support from technical subject matter experts to determine the suitability of each option.

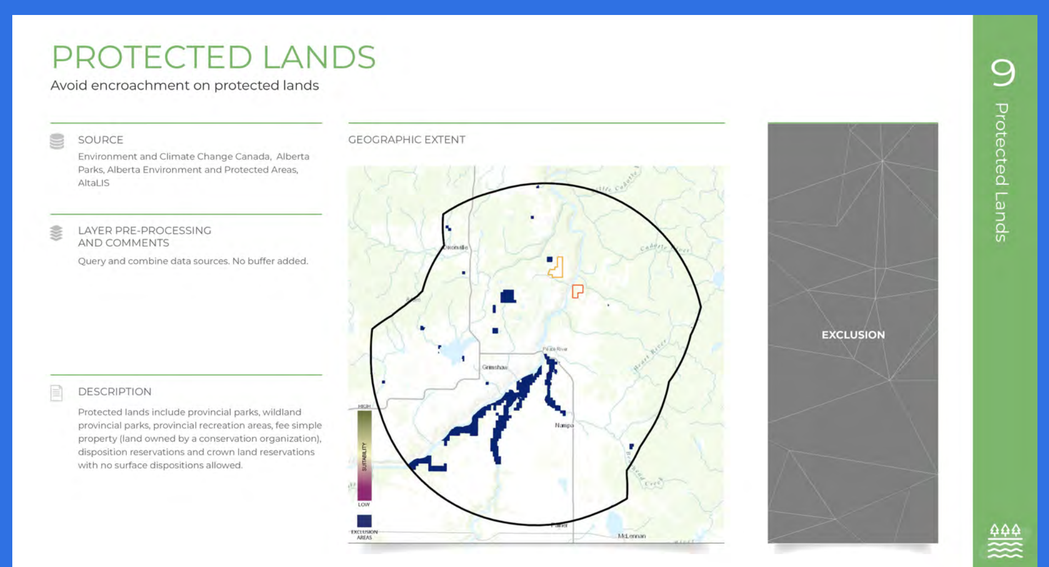
- The evaluation consisted of Technical, Social/Cultural and Environmental criteria to assess which option best meets the technical and safety requirements.

- The criteria come from a number of sources, including CNSC regulations outlining site suitability evaluation requirements.

Examples of factors considered in site suitability evaluation:

- External Natural Hazards – like forest fire risk
- Human Induced Events – like location of airports, other industrial facilities
- Technical needs of the Project – like access to water
- Environmental Criteria – like sensitive wildlife or aquatic habitat
- Social and Cultural Criteria – like workforce commuting distance and availability of emergency services





ENERGY Alberta

Technology Provider - CANDU® Energy

Canadian nuclear generating stations utilize CANDU® reactors – heavy water reactors developed by Canadian scientists and engineers. CANDU® stands for Canada deuterium uranium, reflecting its use of deuterium oxide (heavy water) as a moderator and coolant and uses natural (not enriched) uranium as a fuel. Canada is also one of the largest producers of uranium in the world.

CANDU®: A Proven Technology

- CANDU® reactors have accumulated more than 900 years of safe operating experience in seven countries around the world.

- There are 19 operating CANDU® reactors in Canada – 18 in Ontario and one in New Brunswick.

- Canada has exported CANDU® technology around the world with 30 reactors in operation globally. India operates 16 reactors that are based on the CANDU® design.

Better than before: the CANDU® MONARK

- The CANDU® MONARK™ ’s robust Generation III+ Design is an evolution on the Canadian-made technology used around the globe.

- The reactor and its surrounding facilities are compact, allowing for a smaller footprint that ensures safety is paramount in every feature.

- This design is quieter than the previous generation of CANDU® reactors, minimizing disruption to surrounding communities and residents.

ENERGY Alberta

Technology Provider - CANDU® Energy

Medical Isotope's life-saving components

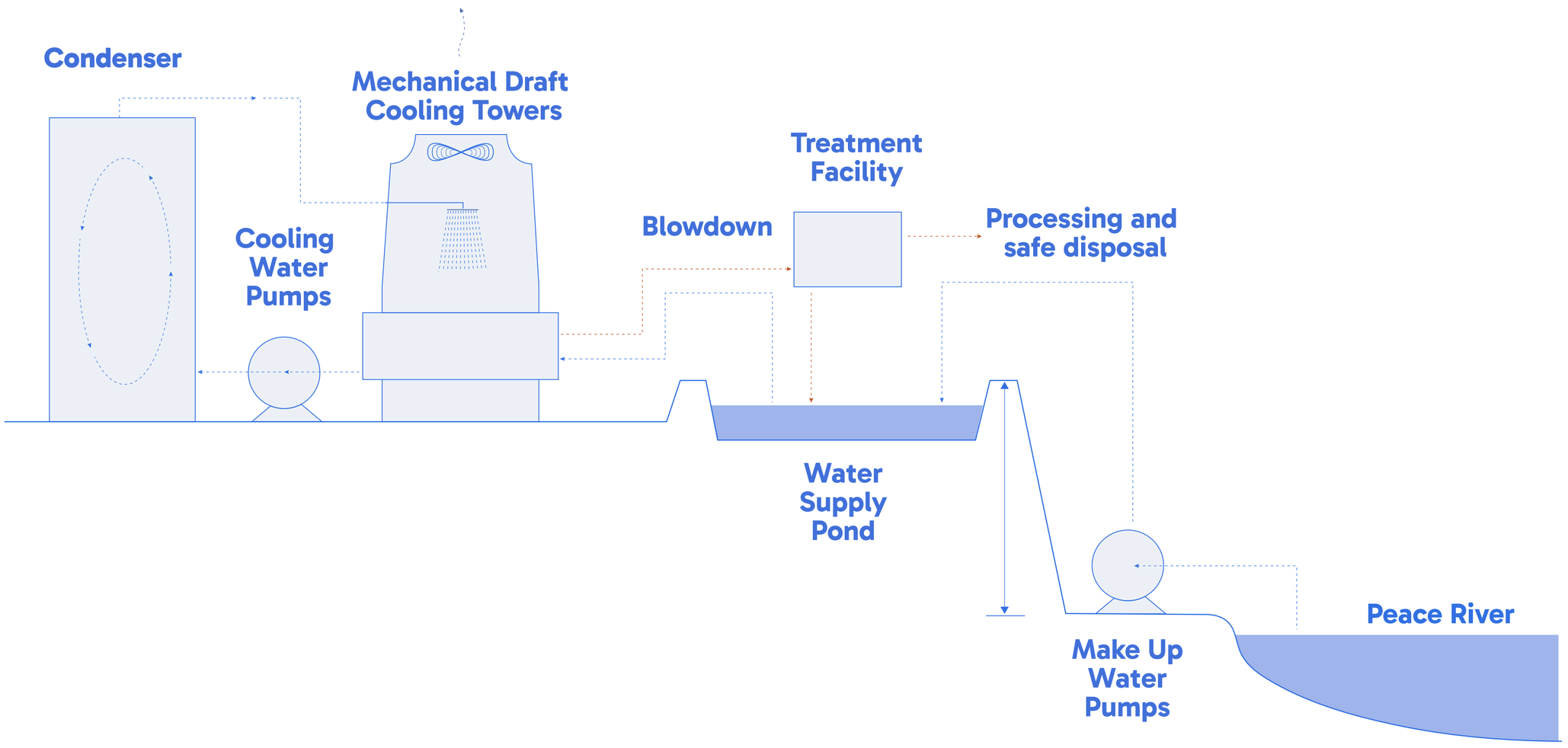
- CANDU® MONARK™ is the ONLY power reactor able to co-produce life-saving medical isotopes.

- Medical isotopes are used for medical equipment sterilization, cancer diagnosis and life-saving cancer treatments.

- CANDU® reactors in Ontario currently produce 50% of the world's supply of Cobalt-60 which is used to sterilize 40% of the world's single-use medical devices.

ENERGY Alberta

Water Use



*Designs reflect current details and are subject to change.

Cooling Water Infrastructure:

Key components of the facility's cooling water infrastructure include:

- Water intake, pipeline and access road to the river
- Mechanical draft cooling towers to transfer heat from the steam driving the turbines to the air
- Water ponds for power production needs if the volume from the river is reduced due to ice conditions or low water levels in the river

ENERGY
Alberta

Water Use

A consistent water source, primarily used for cooling,
is an integral part of the Peace River Nuclear Power Project.

How does the Cooling System work:

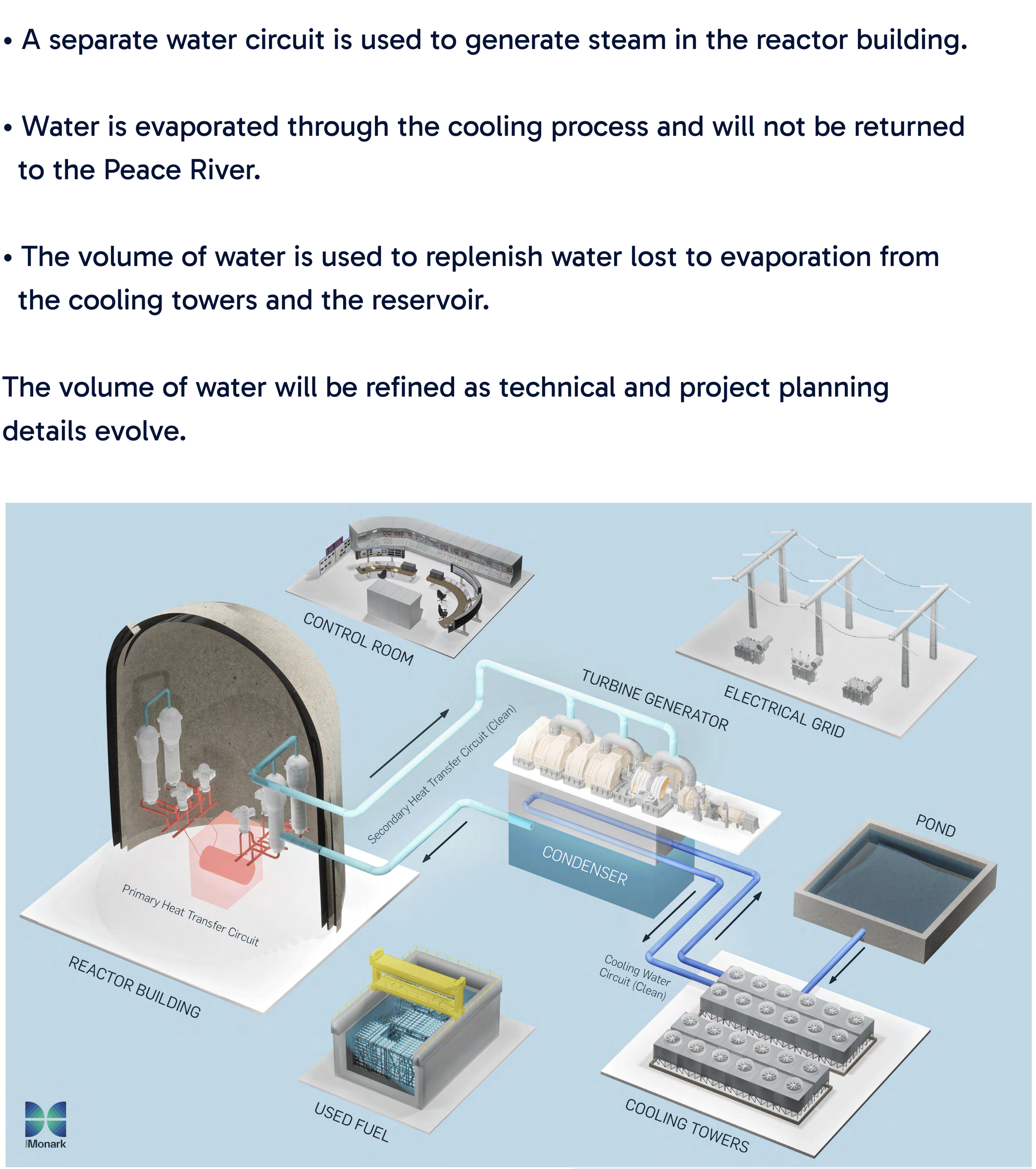
- Water is withdrawn from the Peace River, stored in a water reservoir on-site and used to cool the facility.

- A separate water circuit is used to generate steam in the reactor building.

- Water is evaporated through the cooling process and will not be returned to the Peace River.

- The volume of water is used to replenish water lost to evaporation from the cooling towers and the reservoir.

The volume of water will be refined as technical and project planning details evolve.



3D Rendering of Water Cooling System

ENERGY Alberta

Commitment to Water Management

Energy Alberta is proposing to build a nuclear power generating station along the banks of the Peace River.

- The facility will withdraw water from the Peace River to use for cooling requirements and other processes required for safe operations.

- Advanced technology will be utilized to recycle the cooling water and reduce the amount of water needed.

Regulated water management process

- Regulated by local, provincial and federal governing bodies for effective conservation and stewardship of water.

- Environmental programs to monitor, track and analyze surrounding ecosystems to safeguard the health of people and the environment.

- A Water Act license is required to monitor the facility's water use and compliance.

- A study of the area of the Peace River that would require the withdrawal of water is currently ongoing as the initial step to apply for a water license.

Nuclear Waste Management

In Canada, the Canadian Nuclear Safety Commission (CNSC) and the Nuclear Waste Management Organization (NWMO) oversee and regulate every stage of nuclear waste management, from handling and transport to storage and final disposal. These governing bodies ensure nuclear radioactive waste is disposed of in a controlled, consistent and safe manner.

During operations, waste will be stored and managed on-site and removed as part of decommissioning.

Canada's Long-Term Plan

The NWMO has selected Wabigoon Lake Ojibway Nation and the Township of Ignace in Ontario to host future deep geological repository sites.

Deep Geological Disposal has been extensively studied for several decades, including the construction and operation of underground research laboratories where large-scale in-situ tests are being conducted.

Types of Nuclear Waste

Every nuclear facility generates some form of each level of waste.

- **Low-Level Waste:** Minimal radioactivity can be safely handled with minimal protection such as used protective clothing, tools and lab waste.
- **Intermediate-Level Waste:** This waste requires shielding during handling and storage and includes reactor components or resins from water treatment.
- **High-Level Waste:** This waste primarily comes from used nuclear fuel after it has been used in a reactor. Highly radioactive, this waste requires robust containment and cooling measures.
- **Used Nuclear Fuel:** Used uranium fuel rods from reactors that have accumulated radioactive isotopes through fission.

ENERGY Alberta

Radiation Safety

For over 60 years, Canada has been a global leader in nuclear energy research, technology and development, and as such, Canada's nuclear industry is subject to some of the strictest radiation safety standards in the world.

Rigorous Radiation Safety Standards

Nuclear power facilities adhere to rigid radiation protection regulations under the Nuclear Safety Control Act, as well as recommendations from international organizations that provide global safety standards for radiation exposure.

Safety Measures in Canadian Nuclear Facilities

- Containment structures
- Radiation shielding
- Monitoring systems

Types of Radiation

- **Ionizing Radiation:** Produced by nuclear power facilities and medical x-ray machines
- **Non-Ionizing Radiation:** Produced by microwaves, or Wi-Fi
- **Naturally Occurring Radiation:** Naturally produced, present in everyday foods like bananas

Did you know?

Radiation is all around us. Radioactive elements such as potassium-40 and carbon-14 are present in some of the foods we eat every day, like bananas and potatoes.

ENERGY Alberta

Radiation Safety

Radiation Dose Examples:

*Canadian Nuclear Safety Commission (modified)

Radiation dose millisievert: mSv

1,000

500

100

50

10

1

1,000 mSv

Dose that may cause some symptoms of radiation sickness

7 mSv

Typical chest CT scan

1 mSv

Annual public dose limit

0.1 mSv

Typical chest x-ray

0.005 mSv

Dental x-ray (intraoral)

0.001 mSv

Typical dose from living within a few km of an operating nuclear power plant in Canada for one year

50 mSv

Annual dose limit for nuclear energy workers

1.8 mSv

Average annual dose from natural background radiation in Canada

1 mSv

Typical annual dose received by a worker in a uranium mine or nuclear power plant in Canada

0.02 mSv

Typical cross-Canada flight

ENERGY Alberta

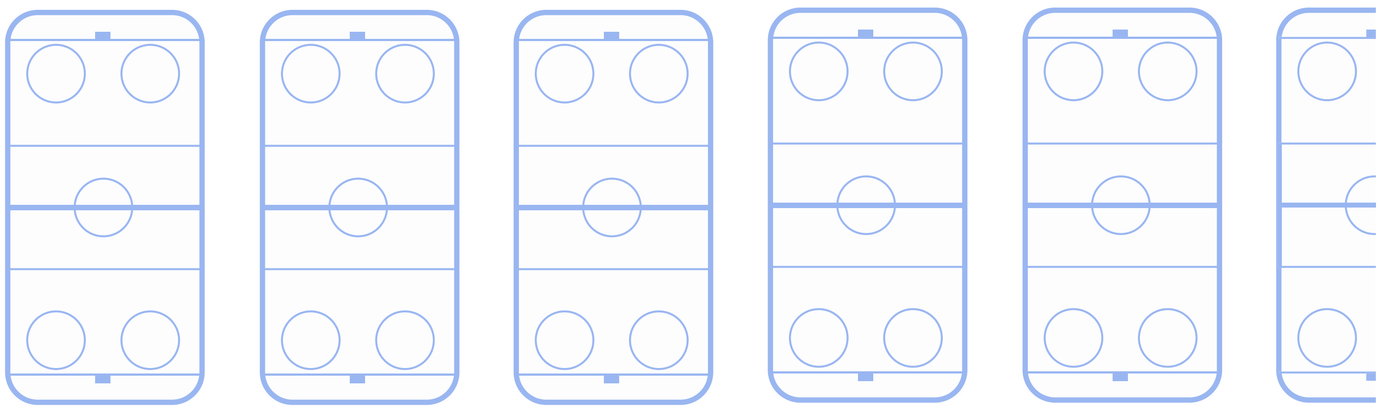
Used Nuclear Fuel

- Radioactivity decreases over time. With modern containment strategies, risks are minimized while technology continues to improve long-term storage solutions.
- Properly managed waste does not pose immediate threats. Safety protocols and containment measures are strictly followed to protect people and the environment.

How much will this facility generate?

- At the end of its 70-year lifespan, the Peace River Nuclear Power Project will have produced approximately 1.95 million bundles of used fuel.

- If stacked like firewood, all this used nuclear fuel could fit into about 5.5 NHL hockey rinks from the ice surface to the top of the boards.



~1.95 million
5.5 NHL
Hockey Rinks

*Designs reflect current details and are subject to change.

Did you know?

One soda can is equivalent to all the used fuel waste generated from one person's lifetime power consumption, if they were to use nuclear energy their entire life.

ENERGY Alberta

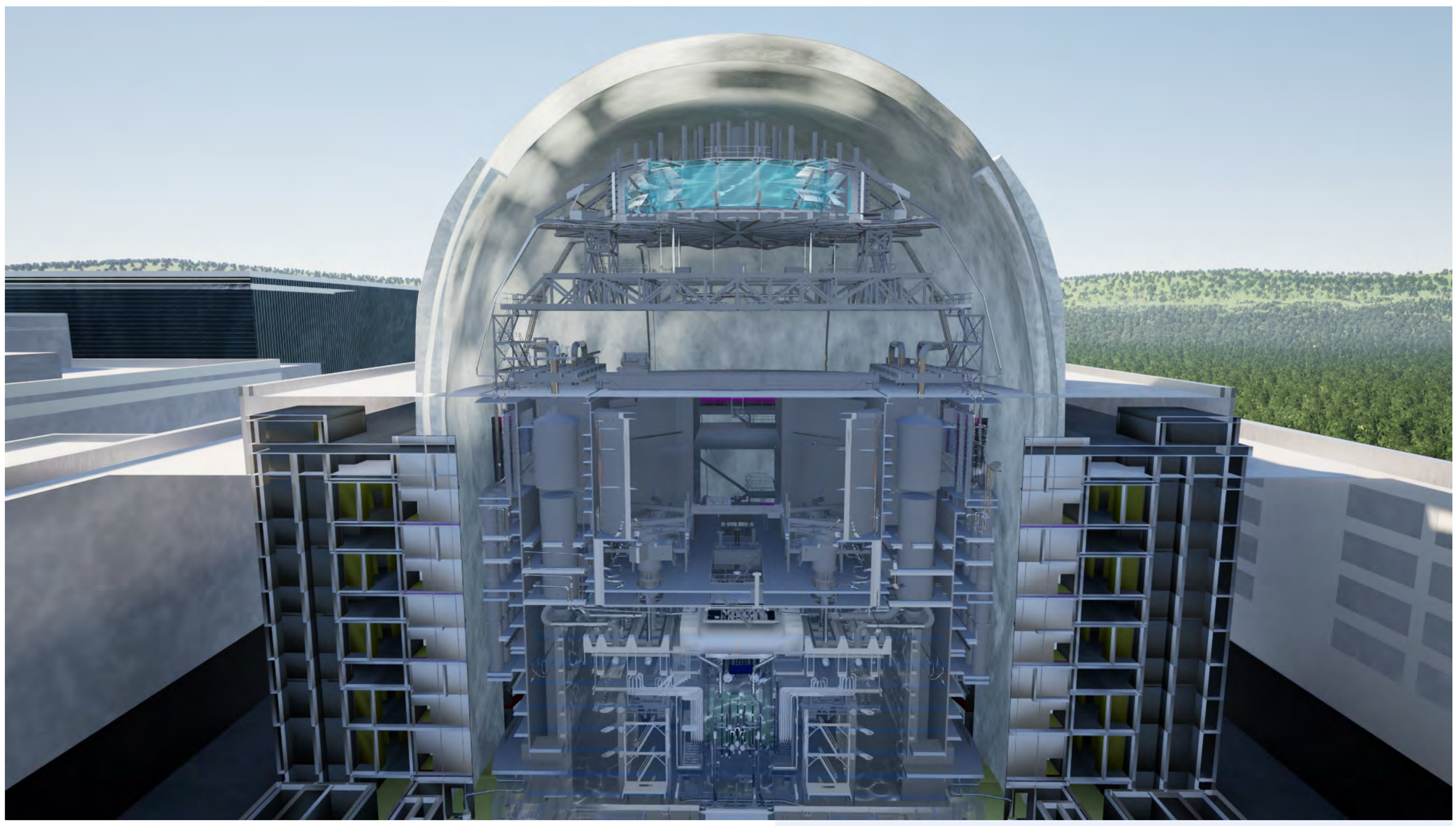
CANDU®
Safety Features

- CANDU® MONARK™ is designed to resist high levels of seismic activity in alignment with international regulations.
- Designed to withstand unlikely, high risk events including aircraft impact and extreme weather.

Passive Safety Systems

- CANDU® MONARK™ has multiple redundant safety features, and these have continued to improve over time, which include:

  - An elevated reserve water tank that will release, passively cooling the core without operator intervention for 72+ hours achieving what is called ‘Walk-Away-Safe’ design.
  - Systems that allow for the facility to continue safe cooling even under the most extreme accident conditions.



3D Rendering of Elevated Water Reserve Tank

ENERGY Alberta

Proposed Regulatory Timeline

- Energy Alberta plans to submit an Initial Project Description in Q1 2025 – that will initiate the federal Impact Assessment (IA) process.

- The IA process is led by the Impact Assessment Agency of Canada (IAAC) and the Canadian Nuclear Safety Commission (CNSC) and will evaluate the potential effects of the Project on the environment, health, society and economy.

- The IA process considers the impact on Indigenous Peoples and their inherent rights.

- An IA is a phased planning process spanning multiple years, involving extensive Indigenous, community and public engagement, as well as comprehensive environmental and socio-economic studies.

ENERGY Alberta

Benefits of Nuclear Energy in Canada

Nuclear energy is one of Canada's safest and cleanest energy sources and is recognized globally as a critical tool in reducing greenhouse gases and fighting climate change.

Not only is it clean, but it also provides stable pricing and a reliable energy supply to help address Alberta's energy security.

Canada's nuclear industry is an economic engine, offering high-paying jobs to skilled workers, and significant revenue for Canadians.

*Source Canadian Nuclear Association and Government of Canada.

Jobs

89,000 people employed.

Revenue

$22 billion in annual GDP contribution.

Output

15% of Canada's electricity.

Environmental Advantage

80 million tonnes of CO2 emissions per year are avoided.

Energy Security

Nuclear Energy runs 24/7, 365 days a year.

Supply

Canada is the second largest uranium producer in the world.

Nuclear in Canada

15%

of Canadian electricity is from nuclear energy - 59% in Ontario.

$17

billion annual contribution to Canada's GDP - 76,000 jobs.

45

million tonnes of avoided CO2 emissions annually.

ENERGY Alberta

Connect with Us

We’d love to hear from you. Whether you’re curious about the Project, need media assistance or are interested in working with us - we’re ready to answer your questions.

You can reach us by using the contact form or information listed below.

Email:

Info@EnergyAlberta.com

Media Inquiries:

Media@EnergyAlberta.com

Procurement

Energy Alberta is focused on building relationships with Indigenous, local and regional businesses. Register as a potential supplier by adding your name to our vendor list.

www.energyalberta.com/procurement-registry

Work with us

Energy Alberta will support employment and skills training opportunities for Indigenous, local and regional workers. Register today to receive updates on future opportunities to join our team.

www.energyalberta.com/jobs-registry

ENERGY Alberta

We want to hear from you!

What's important to you and your community?

Using sticky notes, please share your comments.

ENERGY Alberta

We want to hear from you!

How would you like to be engaged about this Project?

Using sticky notes, please share your comments.

ENERGY Alberta

Appendix E: Water Wells

Appendix E-1: Water Wells Within the RSAs

Water Well Driller Record	Legal and Land Location	Client Name	Well Use	Driller Name	Date Completed	Drilling Method	Elevation (m ASL)	Total Borehole Depth (m BGS)	Screen Length (m)	Screen Bottom (m BGS)
Location 1										
399975	4-19-87-20-W5	SHELL OIL CO	Industrial	UNKNOWN DRILLER	1950-11-25	Unknown	525.0	226.2	-	-
400033	2-13-87-21-W5	SHELL OIL CO OF CAN#SP	Industrial	UNKNOWN DRILLER	-	Unknown	531	4.6	-	-
359118	NE-31-85-21-W5	LILLICO, K.	Domestic	UNKNOWN DRILLER	-	Not Applicable	593	-	-	-
359119	NE-31-85-21-W5	POCKNELL, AL	Domestic	UNKNOWN DRILLER	-	Not Applicable	610	-	-	-
359231	NW-6-86-21-W5	MORESIDE, STEVE	Domestic	MCALLISTER WATERWELLS LTD.	1982-06-09	Rotary	610	61.0	-	-
359240	SE-12-86-22-W5	MUELLER, HANS	Domestic	UNKNOWN DRILLER	1973-06-08	Not Applicable	640.0	-	-	-
359241	SE-13-86-22-W5	SHAW, ED	Domestic	LBR CONTRACTORS LTD.	1971-06-01	Rotary	-	8.5	-	-
359242	1-13-86-22-W5	SHAW, EDWIN	Domestic	UNKNOWN DRILLER	-	Hand Dug	597.0	4.0	-	-
359243	SW-13-86-22-W5	ADOLFSON, THOR	Domestic	UNKNOWN DRILLER	-	Hand Dug	614	6.1	-	-
359244	WH-13-86-22-W5	ADOLFSON, THOR #702H	Domestic	WATER RESOURCES	-	Unknown	639	23.2	-	-
359245	WH-13-86-22-W5	ADOLFSON, THOR #701H	Domestic	WATER RESOURCES	1969-07-12	Unknown	639	7.9	-	-
492655	1-13-86-22-W5	DAVIE, WAYNE	Domestic	ANDERSON AIR DRILLING LTD.	1998-07-24	Rotary	-	97.5	-	-
497610	SE-13-86-22-W5	DAVIES, WAYNE	Domestic	KLYMIUK WATER WELL DRILLING	1998-08-13	Rotary	-	30.5	1.5	18.3
9516044	NE-31-85-21-W5	BLAYONE, JANET	Domestic	ANDERSON WATER SERVICES LTD.	2013-06-10	Rotary - Air	-	30.5	-	-
492656	5-13-86-22-W5	ADOLFSON, THOR	Domestic	ANDERSON AIR DRILLING LTD.	1998-07-25	Rotary	-	30.5	12.2	24.4
495172	5-13-86-22-W5	ADOLFSON, THOR	Domestic	ANDERSON AIR DRILLING LTD.	1998-08-26	Rotary	-	24.4	1.2	24.1
359232	NW-7-86-21-W5	CRAIG, CINDY	Domestic & Stock	SANDERSON, LLOYD	1979-08-17	Cable Tool	593	19.2	1.8	19.2
359394	4-18-86-21-W5	HUDSON'S BAY/UNION#S.T.H. 14	Industrial	STRUCTURAL TEST HOLE	1952-09-11	Unknown	593	213.4	-	-
359395	13-19-86-21-W5	FRONTIER GEOPH#STH 174-249	Industrial	STRUCTURAL TEST HOLE	1954-10-04	Unknown	598	280.4	-	-
365009	15-31-85-21-W5	WEBERVILLE WATER CO-OP	Municipal	MCALLISTER WATERWELLS LTD.	1992-03-10	Rotary	-	12.2	-	-
365010	15-31-85-21-W5	WEBERVILLE WATER CO-OP	Municipal	MCALLISTER WATERWELLS LTD.	1992-03-19	Rotary	-	11.0	3.0	7.9
9516131	15-31-85-21-W5	WEBERVILLE WATER CO-OP	Other	ANDERSON WATER SERVICES LTD.	2015-09-20	Rotary - Air	-	8.8	3.0	7.9
9516131	15-31-85-21-W5	WEBERVILLE WATER CO-OP	Other	ANDERSON WATER SERVICES LTD.	2015-09-20	Rotary - Air	-	8.8	0.9	8.8
357203	SW-30-86-20-W5	HARTER, DORIS#WELL 2	Domestic	UNKNOWN DRILLER	-	Not Applicable	-	-	-	-
359233	NW-9-86-21-W5	ALTA ENV #0818E WIEBE, S.	Domestic	WATER RESOURCES	1972-06-16	Unknown	533	61.0	-	-
359234	NE-9-86-21-W5	WIEBE, BILL	Domestic	SANDERSON, LLOYD	1985-06-17	Cable Tool	-	18.3	-	-
359396	12-22-86-21-W5	FRONTIER GEOPH#STH 174-250	Industrial	STRUCTURAL TEST HOLE	1954-10-06	Unknown	539	249.9	-	-
399973	4-5-87-20-W5	SHELL OIL CO	Industrial	UNKNOWN DRILLER	1950-11-20	Unknown	515.0	214.0	-	-
359235	14-24-86-21-W5	ALTA ENV #1221E LARAMORE, C.	Observation	UNKNOWN DRILLER	1974-07-08	Unknown	-	19.8	-	-
398526	SW-30-86-20-W5	LARAMORE, S.#1818 819E	Unknown	UNKNOWN DRILLER	1972-06-16	Unknown	495.0	56.4	-	-
398524	4-19-86-20-W5	SHELL OIL CO #STH38	Industrial	UNKNOWN DRILLER	1950-11-16	Unknown	512.0	222.8	-	-

Appendix E-1: Water Wells Within the RSAs

Water Well Driller Record	Legal and Land Location	Client Name	Well Use	Driller Name	Date Completed	Drilling Method	Elevation (m ASL)	Total Borehole Depth (m BGS)	Screen Length (m)	Screen Bottom (m BGS)
Location 2										
340185	12-1-86-21-W5	WAGNER, TERRY	Domestic	ANDERSON AIR DRILLING LTD.	2000-09-10	Cable Tool	-	36.6	-	-
398392	SW-31-85-20-W5	NIXON, LARRY	Domestic	UNKNOWN DRILLER	-	Unknown	-	-	-	-
398394	NE-31-85-20-W5	GRIEP, B.	Domestic	UNKNOWN DRILLER	-	Not Applicable	-	-	-	-
398522	6-6-86-20-W5	17 RANCHING LTD	Domestic	UNKNOWN DRILLER	1972-01-01	Unknown	594.0	7.6	1.8	7.6
359124	SW-13-85-21-W5	PACIFIC LIAICON LTD VANCOUVER	Domestic	CARIBOO WATER WELLS LTD.	1988-05-10	Rotary	-	24.4	3.0	24.4
359125	SW-13-85-21-W5	PACIFIC LIAICON LTD	Domestic	CARIBOO WATER WELLS LTD.	1988-08-07	Rotary	-	20.7	1.2	19.5
359125	SW-13-85-21-W5	PACIFIC LIAICON LTD	Domestic	CARIBOO WATER WELLS LTD.	1988-08-07	Rotary	-	20.7	1.2	20.7
398366	9-8-85-20-W5	SYDORCHUK, WM	Domestic	UNKNOWN DRILLER	-	Drilled	521.0	48.8	-	-
398380	4-15-85-20-W5	OSLIE, MRS	Domestic	UNKNOWN DRILLER	-	Unknown	526	6.1	-	-
398369	1-9-85-20-W5	THOMPSON, CHRIS	Domestic & Stock	UNKNOWN DRILLER	-	Unknown	541	27.4	-	-
398340	12-31-85-19-W5	SHELL OIL CO #SP	Industrial	UNKNOWN DRILLER	-	Unknown	572	-	-	-
359120	SW-13-85-21-W5	PACIFIC LIAICON VANCOUVER#88-1	Observation	CARIBOO WATER WELLS LTD.	1988-05-09	Rotary	-	36.6	-	-
359121	SW-13-85-21-W5	PACIFIC LIAICON#WELL 2 TH88-2	Observation	CARIBOO WATER WELLS LTD.	1988-05-10	Rotary	-	25.6	3.0	24.4
359122	SW-13-85-21-W5	PACIFIC LIAICON VANCOUVER#4	Observation	CARIBOO WATER WELLS LTD.	1988-05-13	Rotary	-	24.4	1.2	24.1
359123	SW-13-85-21-W5	PACIFIC LIAICON LTD#WELL3 WEST	Observation	CARIBOO WATER WELLS LTD.	1988-05-12	Rotary	-	24.4	1.8	23.8
398378	SW-15-85-20-W5	OSLIE, BILL	Unknown	HILL'S DRILLING	1984-04-26	Cable Tool	-	67.1	-	-
351372	SE-28-85-20-W5	GLASIER, W.	Domestic	BIG IRON DRILLING LTD.	1989-12-18	Rotary	-	30.5	3.1	20.1
398388	1-26-85-20-W5	DZIENGIELEWSKI, HENRY	Domestic	UNKNOWN DRILLER	-	Unknown	565.0	3.7	-	-
492646	SE-21-85-20-W5	GLASIER, LLOYD	Domestic	KLYMIUK WATER WELL DRILLING	1998-07-31	Rotary	-	45.7	12.2	36.6
492647	SE-28-85-20-W5	GLACIER, WENDAL	Domestic	KLYMIUK WATER WELL DRILLING	1998-08-07	Rotary	-	54.9	12.2	30.5
398396	16-33-85-20-W5	SHELL OIL CO #STH4	Industrial	UNKNOWN DRILLER	1950-06-24	Unknown	511	189.0	-	-
398521	SE-1-86-20-W5	SHELL OIL CO #STH17	Industrial	UNKNOWN DRILLER	1950-08-07	Unknown	570	249.9	-	-
9516023	9-24-85-21-W5	SHELL CANADA	Industrial	ANDERSON WATER SERVICES LTD.	2012-02-18	Rotary - Air	-	18.3	3.1	18.3
9516024	9-24-85-21-W5	SHELL CANADA	Monitoring	ANDERSON WATER SERVICES LTD.	2012-02-17	Rotary - Air	-	17.7	3.8	17.7
9516027	9-24-85-21-W5	SHELL CANADA	Monitoring	ANDERSON WATER SERVICES LTD.	2012-02-16	Rotary - Air	-	18.0	3.1	15.8
9516028	9-24-85-21-W5	SHELL CANADA	Monitoring	ANDERSON WATER SERVICES LTD.	2012-02-21	Rotary - Air	-	17.9	3.1	17.9
9516025	9-24-85-21-W5	SHELL CANADA	Observation	ANDERSON WATER SERVICES LTD.	2012-02-16	Rotary - Air	-	17.7	3.0	17.7
9516026	9-24-85-21-W5	SHELL CANADA	Observation	ANDERSON WATER SERVICES LTD.	2012-02-16	Rotary - Air	-	17.1	2.7	17.1
398387	1-22-85-20-W5	OSINCHUK, WILLIAM	Stock	UNKNOWN DRILLER	-	Hand Dug	556.0	10.7	-	-
398391	1-26-85-20-W5	DZIENGIELEWSKI, HENRY	Stock	UNKNOWN DRILLER	-	Unknown	565.0	9.5	-	-
398384	1-21-85-20-W5	ALTA ENV #484-H	Unknown	ALBERTA ENVIRONMENT	1968-11-15	Bored	521.0	22.9	-	-