21R-04370

Initial Project Description – Plain Language Summary

Marguerite Lake
Compressed Air Energy Storage
NW-35-064-06 W4M

Prepared for:
Federation Group Inc.

Prepared by:
Vertex Professional Services Ltd.

Date:
November 23, 2023

Initial Project Description – Plain Language Summary
Marguerite Lake Compressed Air Energy Storage NW-35-064-06 W4M

Prepared for:
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Jesse Dirom, B.Sc., MBA — Date
REGULATORY MANAGER, REPORT REVIEW

Federation Group Inc. (Federation) has written this Plain Language Summary, in accordance with the Project Description Guidelines, to provide a short description of its Compressed Air Energy Storage Project and to describe how the Project will affect the environment. It also explains what Federation plans to do if it receives approval from the Government of Alberta and the Government of Canada to build the Project. The summary is available in: English and French. For a more detailed and technical version of the Initial Project Description, please refer to the full Initial Project Description.

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Glossary of Terms

Term	Definition
Assets	A resource with economic value that an individual or corporation owns or controls
Best Management Practice	Methods that have been determined to be the most effective and practical means of preventing or reducing impacts
Biological diversity	The different kinds of life found within an area. This includes animals, plants, fungi and microorganisms like bacteria
Compressed Air Energy Storage	A process to store energy for later use using compressed air
Consultation	Listening to, and discussing the concerns of, Indigenous Peoples, with an intent to understand and consider the potential adverse effects of an activity
Decommissioning	To remove from service. Involves cleaning, removing equipment and salvaging materials
Disposal wells	A well that will be used to dispose of brine/saline water following solution mining
Engagement	To build relationships with Indigenous Nations by exchanging information in the absence of legal consultation obligations
Expander generator	A generator that is powered by the expansion of compressed air
Fugitive emissions	Emissions from unintentional or intentional release to the atmosphere. Releases can be accidental, caused by equipment leaks, defective seals or joints, or can be intentional through venting, flaring or discharging of greenhouse gas emissions
Greenhouse gas	Gases that trap the heat and energy from the sun in the Earth's atmosphere, producing a greenhouse effect
Migratory	Wildlife species that move from one region to another, typically due to changing of the seasons
Mitigation measures	Means to prevent, reduce or control adverse environmental effects of a project
Observation well	A water well that will be used to monitor water quality and quantity during operations
Reclamation	The act of restoring to previous use. This will entail re-grading, replacing subsoil and topsoil, and stabilizing the soil with vegetation
Solution mining	For this Project, the process of using water to hollow out underground areas for compressed air storage
Source well	A well that will be used as the source of water for the Project
Stakeholder	A person or group with an interest or concern
Substation	A facility where equipment is used to tie together two or more electric circuits through switches
Suspended sediments	Fine inorganic particles of clay, silt or sand and organic particles
Terrestrial	Mostly living on land
The grid	An interconnected network of electrical transmission infrastructure that delivers electricity from producers to consumers
Trenchless crossing	A method or methods to cross under rivers and other environmentally sensitive areas (e.g., wetlands, ravines), as well as railways and roads, by drilling or boring which avoids open cut construction. Often involves direct pipe, horizontal directional drilling and micro-tunnelling.

List of Acronyms

Acronym	Description
A-CAES	Adiabatic CAES
AAAQO	Alberta Ambient Air Quality Objectives
ACO	Aboriginal Consultation Office
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AESO	Alberta Electric System Operator
AIES	Alberta Interconnected Electric System
ATCO	ATCO Electric Ltd.
AUC	Alberta Utilities Commission
BLCN	Beaver Lake Cree Nation
BLMS	Buffalo Lake Metis Settlement
CAES	Compressed Air Energy Storage
CH_4	Methane
CLFN	Cold Lake First Nation
CO_2	Carbon Dioxide
CO_2 e	Carbon Dioxide Equivalent
dBA	A-weighted Decibel
EMS	Elizabeth Metis Settlement
EPA	Alberta Environment and Protected Areas
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
ESA	Environmentally Significant Area
FLMS	Fishing Lake Metis Settlement
GHG	greenhouse gas
GRR	Provincial Grazing Reserve
H2SC	Hydrogen Simple Cycle
ha	Hectares
HADD	harmful alteration, disruption or disturbance
HFC	Hydrofluorocarbons
HLFN	Heart Lake First Nation
HRIA	Historical Resources Impact Assessment
HRV	Historic Resource Value
IAA	*Impact Assessment Act*
IAAC	Impact Assessment Agency of Canada
ktCO2e	Kiloton Carbon Dioxide Equivalent
KCN	Kehewin Cree Nation
km	Kilometre

KMS	Kikino Metis Settlement
kV	Kilovolt
kW-hr	Kilowatt hour
LARP	Lower Athabasca Regional Plan
LAT	Landscape Analysis Tool
LGA	Local Geographic Area
HRIA	Historical Resources Impact Assessment
HRV	Historic Resource Value
m	Metre
M.D.	Municipal District
masl	Metres Above Sea Level
MBCA	*Migratory Birds Convention Act*
MW	Megawatt
N_2O	Nitrous Oxides
NF_3	Nitrogen Trifluoride
NH_3	Ammonia
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
OLCN	Onion Lake Cree Nation
PFC	Perflurorcarbons
SACC	Strategic Assessment of Climate Change
SAR	Species at Risk
SARA	*Species at Risk Act*
SCR	Selective Catalytic Reduction
SF_6	Sulfur Hexafluoride
SLCFN	Saddle Lake Cree First Nation
WLFN	Whitefish (Goodfish) Lake First Nation

PART A: GENERAL INFORMATION

Federation Group Inc. (Federation) is an engineering and energy company focused on providing long-term sustainable energy solutions for its clients and managing energy assets in a responsible way. With its Compressed Air Energy Storage (CAES) Project, Federation is moving the needle on safe, reliable and dependable electricity storage, and helping Canada meet its 2030 and 2050 greenhouse gas (GHG) reduction targets. Federation respects the environment, avoids pollution, disturbs the environment as little as possible, and follows all environmental laws and regulations. Federation is preparing an Environmental Protection Plan (EPP) that workers must follow during construction and operation. The EPP explains to the workers how to protect the environment.

The Project will be reviewed by the Government of Canada, the Government of Alberta, Indigenous Nations, and many other organizations and involved communities. Environmental assessment is an important part of Federation's planning because it helps improve the benefits of the Project and reduce harm to the environment. The Environmental surveys, as well as other studies that Federation has submitted to governments, are thousands of pages long. The Government of Alberta, Alberta Utilities Commission (AUC) website contains these documents.

1.0 Project Information

The name of the Project is the Marguerite Lake Compressed Air Energy Storage (hereafter referred to as the "Project"). The Project is a compressed air storage facility near Cold Lake, Alberta. The Project consists of the construction and operation of a power plant, specifically a CAES plant, located next to the existing Marguerite Lake substation. The regional location of the Project is shown on Figure 1 and an overview of the site is shown on Figure 2. Additional details on the Project location are provided in Section 13.0.

CAES facilities use electric compressors to capture excess electricity, storing the energy as compressed air underground. During hours of low power generation, the compressed air is withdrawn from storage, heated and routed to turbines to generate electricity, which is returned to the electrical grid. An overview of the CAES process is shown on Figure 3.

1.1 Type or Sector

The proposed Project is a power plant, specifically a CAES facility, which will generate electricity with a total capability of 320 megawatts (MW). The Project is part of the energy sector.

2.0 Proponent Information

The company that is building and will own the Project is:

Federation Group Inc.
45521 Hwy 660 #2
PO Box 7217
Bonnyville, Alberta, Canada
T9N 2H6

Federation's contact is:
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Director, Projects
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3.0 Public and Regulatory Engagement Summary

Federation wants to know what people think about the Project, how it may affect them and any concerns they have. Over the past several years, there have been meetings with regulators, businesses and community organizations about the Project. Federation has also consulted with Indigenous Nations in the area to understand the concerns of the Indigenous Peoples that may be affected. Engagement with Indigenous Nations is discussed in more detail in Section 4.0. Federation has, and continues to, consult with Indigenous and public stakeholder groups. Federation will continue to provide opportunities for these groups to participate in consultation during the regulatory review process and throughout the life of the Project. Ongoing consultation activities will include:

- Further consultation with interested parties. Stakeholder questions, concerns or issues will be fully explored and solutions put forward to address or mitigate concerns
- Periodic mailouts to keep all landowners, occupants, residents, interested parties, local authorities, synergy groups and other stakeholders apprised of Project updates
- Establishing a Project website where stakeholders will be able to obtain Project updates and information

Comments from the local municipality and various stakeholders have been mainly positive. The Project provides an opportunity for growth and will have a positive effect on the local economy for the public and Indigenous Groups.

3.1 Regulatory and Public Stakeholders

The Project team began engaging with Federal, Provincial and Municipal agencies in May 2021. Engagement with stakeholders early in the planning of the Project is beneficial to Federation, regulatory agencies and stakeholders as the requirements of regulators and concerns of stakeholders can be identified and addressed in Project planning. Discussions included the CAES technology, an overview of the Project, technical requirements, potential concerns and the regulatory approval and permitting processes.

The regulatory and public stakeholders with a potential interest or potentially affected by the Project were identified and are listed below. The list includes regulators and municipal authorities, regional industrial associations, and adjacent individual and industry landowners. Engagement about the Project was initiated with all stakeholders listed below. The Project notification letter contained a general description, rationale, location, environmental planning approach, schedule and contact information. Adjacent landowners and Crown disposition holders within 2 kilometres (km) of the Project were chosen for engagement based on Alberta Energy Regulator requirements. A Project notification letter was sent to all identified regulatory and public stakeholders. The regulatory and public stakeholders identified for the Project are as follows:

- Government and Municipal Regulators
    - Impact Assessment Agency of Canada (IAAC)

- Alberta Culture and Tourism
- Alberta Electric System Operator (AESO)
- Alberta Energy Regulator
- Alberta Transportation
- Alberta Utilities Commission (AUC)
- Alberta Environment and Protected Areas (EPA)
- Municipal District (M.D.) of Bonnyville No. 87 (hereafter referred to as "M.D. of Bonnyville")
- Wolf Lake Grazing Association

- Industry and Individual Stakeholders
  - Adjacent landowners – Residents and landowners within 2 km of the Project
  - Crown disposition holders within 2 km of the Project
  - ATCO Electric Ltd. (ATCO)
  - Canadian Natural Resources Limited
  - Canadian Oil & Gas International Inc. (no longer exists and notification re-directed to the Orphan Well Association)
  - Cold Lake Pipeline Ltd.
  - Rogers Communications Inc.
  - Telus Communications Inc.

During the spring of 2021, an agreement was reached with Wolf Lake Grazing Association for the lease of the lands for the proposed Project. The M.D. of Bonnyville provided consent to construct an approach off the La Corey resource road (owned by the M.D.) on September 20, 2022. Further consultation with the M.D., including a development permit application, will occur as part of the Project regulatory process.

To date, Federation has resolved all Project specific concerns raised by non-Indigenous stakeholders. Federation had a meeting with the M.D. of Bonnyville on June 30, 2023, to provide an overview of the Project, discuss the road use agreement terms and the development permit. A future meeting to present the Project to the M.D. council may be scheduled, if needed.

Federation will continue to communicate with regulators, industry and landowners to provide additional information and obtain regulatory guidance. Federation will collect feedback and evaluate requests of other public stakeholders and will record all Project-related concerns considered throughout the planning and regulatory review process.

4.0 Indigenous Engagement Summary

4.1 Indigenous Groups

Early engagement with Indigenous groups in the planning of the Project is important to identify community concerns and potential impacts to traditional land use activities and Aboriginal and Treaty Rights. These concerns and potential impacts can often be reduced or eliminated if addressed early in the process with proper Project design and location, development of appropriate mitigation measures and use of best management practices.

Federation identified Indigenous Groups who may have asserted Traditional territory in the Project area, or whose traditional land use activities or Aboriginal and Treaty Rights may be affected by the Project. A Project notification letter was sent to all listed groups (seven First Nations and four Metis settlements). Indigenous communities potentially affected by the Project are:

- Beaver Lake Cree Nation (BLCN)
- Buffalo Lake Metis Settlement (BLMS)
- Cold Lake First Nation (CLFN)
- Elizabeth Metis Settlement (EMS)
- Fishing Lake Metis Settlement (FLMS)
- Heart Lake First Nation (HLFN)
- Kehewin Cree Nation (KCN)
- Kikino Metis Settlement (KMS)
- Onion Lake Cree Nation (OLCN)
- Saddle Lake Cree First Nation (SLCFN)
- Whitefish (Goodfish) Lake First Nation (WLFN)

4.2 Indigenous Engagement

As directed by the Aboriginal Consultation Office (ACO), Federation has been engaged in consultation with the 11 Indigenous communities since May 2021. All communities were provided a Notification Package, which consisted of a plain language Project description form, a Project profile, a survey plan showing the Project location and access, a wetland delineation figure and a Landscape Analysis Tool (LAT) report detailing the baseline physical attributes of the area. Federation followed up with each community regarding the Notification Package. A few of the communities requested Project overview meetings, site visits and/or community information sessions. No site-specific concerns were identified during the site visits. A few communities requested copies of all technical reports and Federation provided a link to a shared folder for this purpose. In June 2021, Federation provided a Record of Consultation to each community for their review and feedback, prior to requesting an adequacy decision from the ACO.

An Indigenous consultation adequacy decision was received from the ACO on July 21, 2021, along with receipt of the formal surface land disposition approval from the Government of Alberta for DML 210041 on August 19, 2021. Additional concerns have been raised since the ACO decision was received and Federation is working to address those concerns. One community, the CLFN, intends to participate in the AUC proceedings and both Federation and the CLFN are working together to address their concerns, with the mutual desire to avoid a hearing. More details on this partnership are provided below.

Key issues and concerns raised during engagement with the Indigenous communities included:

- Project schedule and lifespan
- Required regulatory approvals
- Economic opportunities
- Project footprint and access
- Engineering/geophysical risks (e.g., cavern development)

- Surface drainage
- Sources of water
- Effects on traditional land use (e.g., hunting, trapping, fishing, plant harvesting)
- Effects on cultural sites
- Use of best management practices
- Noise during operations
- Truck traffic
- Reclamation and returning the land to pre-disturbance capability

4.3 Plans for Future Indigenous Engagement

Federation continues to communicate with local Indigenous groups with an interest in the area. Federation is committed to continuing to collect feedback and evaluate requests of Indigenous stakeholders and will record all Project-related concerns considered throughout the Project planning and regulatory review process.

Since July, 2023 Federation and CLFN have submitted joint letters to the AUC, requesting additional time to allow for further activities to continue to work towards resolving CLFN's concerns.

Federation acknowledges that the Project is situated on the traditional territory of CLFN. Federation also recognizes CLFN's perspective that their concerns have not been entirely addressed, and that the Project's direct and adverse impacts on CLFN's Indigenous Rights have not been fully addressed or accommodated. Recent consultation efforts have included the following:

- Information sessions to discuss the Project development and operational details, as well as wildlife habitat and traditional land use concerns
- Technical review meetings to discuss noise impact and emissions modelling assessments, as well as potential risks of subsurface compressed air storage

CLFN and Federation Group are planning further activities to continue to discuss CLFN's concerns and the direct and adverse impacts of the Project on CLFN's Indigenous Rights.

5.0 Studies, Plans and Assessments

Vertex has contacted IAAC about relevant regional studies. No regional assessments near to or applicable to the Project were returned in a search of the Canadian Impact Assessment Registry as of April 18, 2023.

Federal Acts that apply to the Project include the *Impact Assessment Act* (Government of Canada, 2019a), the *Fisheries Act* (Government of Canada, 2019b), the *Migratory Birds Convention Act* (MBCA; Government of Canada, 1994) and the *Species at Risk Act* (SARA; Government of Canada, 2002).

Power plants in Alberta require approval from EPA. Federation has submitted the appropriate documents and received a letter stating that an Environmental Impact Assessment Report is not required. The AUC reviews applications for electricity generation in Alberta. Federation has submitted an Environmental Evaluation to meet the AUC's requirements. Federation has carefully considered all other provincial acts, regulations, guidance documents

and best management practices that apply to the Project.
The Project is located within the M.D. of Bonnyville and Federation is committed to following the municipal bylaws, guidance documents and best management practices that apply to the Project.

The Project is in the Lower Athabasca Regional Area and Federation will follow the Lower Athabasca Regional Plan (LARP), which provides strategic direction in the region. The Project does not fall within any of the Conservation Areas, Provincial Recreation Areas or Public Land Areas for Recreation/Tourism identified by LARP. Federation will follow the Environmental Management Frameworks for air quality, surface water quality, and groundwater and tailings management as identified in LARP.

The Cold Lake Subregional Integrated Resource Plan addresses ecological resources for the area. As the Project is not located within a Provincial Park, an Ecological Reserve, a Natural Area or an Environmentally Significant Area (ESA), this management guideline is not applicable.
The Project is located within the Wolf Lake Provincial Grazing Reserve (GRR 8865). Federation has received consent from the Provincial Grazing Reserve for the Project.

6.0 Strategic Assessments

The Project is not located in a region where any strategic assessment under the *Impact Assessment Act* (IAA) have been conducted. Although it is not specific to the region where the Project is located, the Strategic Assessment of Climate Change (SACC; Government of Canada, 2022) is applicable to the Project and is discussed further in Section 23.0.

PART B: PROJECT INFORMATION

7.0 Purpose, Need and Benefits of the Project

Due to the increase in renewable energy generation, there is a need to store energy for use during peak demands, and to provide consistent power due to the intermittent nature of wind and solar power. The purpose of the Project is to provide storage capability to support intermittent renewable power. The Project has been designed such that it can supply up to 48 hours of full power output.

Federation considered many factors in the siting of the proposed Project location including:

- Location near to an existing substation
- Location near to an existing powerline
- Location that allows for salt cavern mining
- Location that will be able to tie-in to future carbon capture and storage developments

The Project will add jobs to the local community, both during construction and operations.

The Project has been designed with the potential to fire the expanders with hydrogen. There is a goal to retrofit to 100% hydrogen, further reducing emissions. This will assist both the Federal and Provincial governments in their transition to clean energy. With an electricity generation capacity of 320 MW, the Project design will help the

Province meet its net-zero goals for emissions.

8.0 Physical Activities Regulations

The Physical Activities Regulations list the activities and types of projects that require an impact assessment (Government of Canada, 2023a). CAES is not specifically listed under the Physical Activities Regulations; however, the Project will require natural gas for fuel (i.e., be fossil fuel fired) and will produce more than 200 MW. Although the Project will use natural gas initially, Federation plans to transition to using hydrogen by approximately 2035. Based on the provisions above, the Project is a designated physical activity under item 30 of the Physical Activities Regulations.

9.0 Description of Project Activities

Federation is developing a 320 MW CAES facility next to the existing Marguerite Lake substation, which is owned and operated by ATCO. The Marguerite Lake substation provides Federation's CAES access to existing 240 kilovolt (kV) double circuit powerlines. The proposed CAES facility will use electric motor driven compressors to capture excess electricity from the grid and store the energy as compressed air underground.

The Project will consist of a single 125 MW compressor train and two 160 MW expander trains with compressed air storage in a salt cavern. The salt cavern is sized for 48 hours of full-load output and occurs at a depth of 1,100 metres (m) below surface. The depth and thickness at the location provides perfect conditions for using this technology. Each expander train can operate from 16 MW to 160 MW power production. The expansion trains are capable of being powered by 50% hydrogen with a path to 100% in the future.

Natural gas will be required to provide fuel for the expander train turbines until the Project can be fueled by hydrogen. The Project uses about 67% less fuel than current technologies, resulting in lower carbon dioxide (CO_2) emissions per Kilowatt hour (kW-hr) of electricity produced (Siemens Energy, 2021).

9.1 Project Works

The Project's proposed area of disturbance is 13.5 ha (hereafter referred to as the "disturbance area"). The Project includes a graveled, fenced plant site with the following components:

- Electrical power generation (expander train)
- Compression equipment
- Substation (Osborne Creek 1146S)
- Powerline connecting to the existing Marguerite Lake Substation (826S)
- Underground salt caverns
- Source, disposal and observation wells
- Fuel gas pipeline (natural gas needed for the expander)
- Cooling equipment
- Borrow pit/stormwater pond
- Soil storage areas
- Buildings
- Emergency equipment

The equipment and the layout of the Project is shown on Figure 4. The new fuel gas pipeline will tie in on the north side of the site. The pipeline will use an existing pipeline right-of-way and no new land will be required for the proposed pipeline. The planned pipeline diameter is 8 inches and an approximate length of 14 km.

9.2 Project Activities

Project activities can be grouped into pre-construction, construction, operations and maintenance, and decommissioning and reclamation. Pre-construction includes baseline surveys, obtaining permits and required approvals. Up to 200 full-time staff will be employed during construction. Construction activities will include well drilling, clearing, soil stripping and grading of the site, installing foundations and equipment, solution mining of the caverns, and seeding of the topsoil and subsoil piles. Solution mining is the process of using water to hollow out underground areas for compressed air storage. No water is required for the operation of the Project, but water will be required for cavern mining.

The Project is expected to operate for more than 30 years and employ up to 20 full-time staff during operations. During operations, staff will conduct monitoring of the site for erosion, sedimentation or weed growth.

Once the Project is no longer needed, it will be taken out of operation. When the Project is taken out of service, it will be decommissioned, which includes cleaning, removing equipment and salvaging materials, and reclamation (re-grading, and subsoil and topsoil replacement and stabilization). During decommissioning, the fuel gas pipeline will be abandoned in place. The wells will be cleaned, plugged, filled, and then cut and capped according to the well type, approval conditions and requirements of the day. The equipment, buildings and fence will be removed, and the gravel will be salvaged. Subsoil will be ripped in areas where compaction is present. The site will be re-graded, and topsoil and subsoil piles will be redistributed. Reclamation and revegetation will depend on the desired end land use. Monitoring of the success of reclamation will be conducted as per the regulations and conditions of the time.

Additionally, Federation is committed to including CLFN in the planning of decommissioning activities and will work collaboratively with CLFN to develop a framework to guide culturally appropriate reclamation practices. Federation will consult with a CLFN cultural monitor for all decommissioning activities. This means that reclamation planning will be grounded in ensuring that CLFN has the confidence that the environmental quality and resource quantity that underlies the meaningful practice of treaty and Indigenous rights, is sufficient to meet the needs of CLFN at the time of reclamation and for generations to come.

9.3 Incidental Activities

9.3.1 Existing Substation and Powerlines

Federation is proposing the CAES facility be connected to existing 240 kV powerlines through the existing Marguerite Lake Substation, which is owned and operated by ATCO. The ATCO Electric Marguerite Lake substation was developed in the mid-1980s to serve the projected growth of the Cold Lake area oil sands projects and, therefore, the substation is not for the sole benefit of the Project. The existing 9L36 and 9L37 powerlines are currently in-use and are not for the sole benefit of the Project.

9.3.2 Existing Gas Pipeline

The Leming Lake Sales Lateral Loop was constructed in 2014 (Nova Gas Transmission Ltd., 2013). This natural gas pipeline is operated by Nova Gas Transmission Ltd. and is not for the sole benefit of the Project.

Additional activities that are incidental to the Project that would not be under Federation's care or control include telecommunications and highway access to the site.

10.0 Maximum Project Production Capacity

Federation is developing a 320 MW (maximum output) CAES facility, adjacent to the existing Marguerite Lake substation. The Marguerite Lake substation provides Federation's CAES facility (and the 1146S AESO Osborne Creek substation that is part of the Project) access to existing 240 kilovolt (kV) double circuit infrastructure and the Alberta Interconnected Electric System (AIES). The CAES facility will use electric motor driven compressors to capture excess electricity from the grid and store the energy as compressed air underground.

The Project will consist of a single 125 MW compressor train and two 160 MW expander trains with compressed air storage in a solution mined salt cavern sized for 48 hours of full-load output. The solution mined salt cavern for compressed air storage will be at a depth of 1,100 m below surface which provides perfect conditions for utilization of the Siemens Energy SXT-800 compressor and expander technology (Siemens Energy, 2022). Each expander train can operate from 16 MW to 160 MW power production with 20% ramp rate per minute, and full generation in 10 minutes. The two expander trains together have a maximum design output of 320 MW. The expansion trains are capable of 50% hydrogen co-firing with path to 100% in the future.

11.0 Schedule

Upon receiving regulatory approvals, and assuming that a Federal Impact Assessment is not required, the expected Project schedule is as follows:

- Site Access and Well Pad Preparation: May 2025
- Source Water Well Drilling and Testing: May 2025
- Disposal Well Drilling and Testing: May 2025
- Cavern Well Drilling: August 2025
- Site Construction: November 2025 – January 2028
    - Clearing and Site Preparation: November – December 2025
    - Piling and Concrete Foundations: December 2025 – May 2026
    - Equipment Installation: April – September 2026
- Cavern 1 Solution Mining: August 2025 – April 2026
- Cavern 2 Solution Mining: May 2026 – December 2026
- Interconnection/Energization: September 2027
- Cavern 1 Compressed Air Operations: March 2028
- Cavern 2 Compressed Air Operations: September 2028

The Project is expected to be in operation for 30 years or more and, based on the above schedule, this would mean that operations would occur between approximately 2028 and 2058. Decommissioning would occur after 2058 and take approximately 1 year. Abandonment of the facility would occur after 2060 and would take up to 5 years (but is

dependent on the regulations of the time and the desired end land use).

If a Federal Impact Assessment is required, the Project schedule would need to be adjusted. The schedule below reflects the schedule incorporating an estimated 2.5 years from the Agency's decision to conduct an impact assessment.

- Site Access and Well Pad Preparation: October 2026
- Source Water Well Drilling and Testing: October 2026
- Disposal Well Drilling and Testing: October 2026
- Cavern Well Drilling: January 2027
- Site Construction: February 2027 – July 2029
    - Clearing and Site Preparation: February – March 2027
    - Piling and Concrete Foundations: March – August 2027
    - Equipment Installation: September 2027 – March 2028
- Cavern 1 Solution Mining: January – September 2027
- Cavern 2 Solution Mining: October 2027 – May 2028
- Interconnection/Energization: January 2029
- Cavern 1 Compressed Air Operations: August 2029
- Cavern 2 Compressed Air Operations: February 2030

The Project is expected to be in operation for 30 years or more. Based on the schedule provided above (in the event a Federal Impact Assessment is required), operations would occur between approximately 2030 and 2060. Decommissioning would happen after 2060 and take approximately 1 year. Abandonment of the facility would occur after 2062 and would take up to 5 years (but is dependent on the regulations of the time and the desired end land use).

12.0 Alternatives to the Project

12.1 Alternatives to the Project

During the design of the Project, several factors were considered when selecting the location and the technology used for the Project. When considering the location, Federation considered distance to existing roads, substations and powerlines, the geology needed for solution mining, groundwater in the area, as well as potential for future hydrogen sources. Federation considered the potential to use naturally occurring salt caverns, which would restrict the flexibility of the location. An alternate technology used for CAES is Adiabatic CAES (A-CAES), which reuses stored thermal energy to preheat the compressed air (rather than using natural gas or hydrogen to preheat the air); however, this technology only allows for short term energy storage.

12.2 Alternative Means

A new natural gas generated power plant is an alternative to the Project and this could meet peak energy demands. However, the flexibility and start up speed of a CAES facility is better suited to meeting energy demands in the region. A CAES facility also allows for energy storage, while a natural gas fired generator would not have this capability. Additional alternatives to the Project that would include energy storage are pumped storage hydro, battery storage and hydrogen energy storage systems. These alternatives typically cost more or are not appropriate for the flat terrain found in the region, and CAES offers a longer duration for energy storage (i.e., from 8 to 48 hours).

PART C: LOCATION INFORMATION AND CONTEXT

13.0 Description of the Project Location

13.1 Geographic Location and Legal Land Description

The Project is located on public land owned by the provincial government (Crown land) in LSD 14 of 35-064-06 W4M, about 16 km north of the town of La Corey, Alberta (Figure 1). EPA has issued a miscellaneous lease (DML 210041, Plan No: 148028 MS) to Federation for the Project. The Project falls within the Wolf Lake Provincial Grazing Reserve boundary (Figure 2).

The location of the approximate center of the Project site is:

- Latitude 54.585788
- Longitude -110.803468

13.2 Site Maps

The Project's general location is shown on Figure 1. This figure shows the regional location of the Project in relation to international and provincial borders, the nearest First Nation Reserve/Metis Settlement, Department of Defence lands, parks, Crown land, Provincial ESAs and airports. Figure 2 shows an overview of the Project location at a closer scale. Figure 2 shows nearby roads, towns, lakes and the Wolf Lake Provincial Grazing Reserve.

13.3 Permanent, Seasonal or Temporary Residences

The nearest affected community is the hamlet of La Corey, Alberta, located 16 km south of the Project(Figure 1). The nearest residence, the Wolf Lake Grazing Reserve Headquarters/Residence, is located approximately 900 m southwest of the disturbance area in SE-34-064-06 W4M. The residence is typically occupied for 6 months of the year during spring, summer and fall (T. Silzer, personal communication, January 23, 2023). During the spring of 2021, Federation reached an agreement with Wolf Lake Provincial Grazing Association for the lease of the lands for the proposed Project. The next closest residence is over 2 km away in NE-21-064-06 W4M. The nearest residences are shown on Figure 5.

13.4 Indigenous and Traditional Land Use

The nearest First Nations Reserve is Cold Lake 149B, located 32 km east of the Project. The nearest Metis Settlement is KMS, located 85 km west of the Project. There are currently no comprehensive land claim agreements or self-government agreements in the vicinity of the Project (Government of Canada, 2016; Government of Alberta, 2023a).

As described in Section 4.0, there are 11 Indigenous communities that may be affected by the Project. Federation has been engaged in consultation with these communities since May of 2021. A summary of the identified concerns is presented below.

CLFN identified that the Project overlaps Traditional Territory lands used by the Nation. General concerns included effects on subsistence hunting for large game and the potential direct impact on wildlife and plants. As the Nation

is unfamiliar with CAES projects, they requested additional Project details and a site visit to further assess impacts. A site visit was conducted and no site-specific concerns were identified. Concerns around noise, vibration, the potential safety risks associated with air storage, and long-term impacts of the Project in the decommissioning and reclamation phases have been raised and Federation is currently working to respond to and address these concerns.

The HLFN shared information that identified concerns around general cumulative effects. The Nation requested a response regarding wildlife impacts, traffic, surface disturbance and mitigation to reduce impact to the environment. A detailed response was provided to HLFN on June 21, 2021, and no further response has been received from HLFN. The Project area was identified as an area of traditional use including hunting, trapping, food gathering and medicine gathering. However, no site-specific or permanent traditional land use locations were identified.
KMS indicated that lands surrounding the area have historical and contemporary traditional land uses. They raised general concerns regarding habitat, fragmentation, access, water and cumulative effects. Following discussions and the completion of their review, the KMS identified no site-specific concerns and provided a letter that outlined general concerns on behalf of the Metis settlement.

Federation will continue consultation throughout the life of the Project, working with the Indigenous groups to reduce impact to Indigenous and traditional land use.

13.5 Proximity to Federal lands

The Project is not located on Federal lands. The nearest Federal lands are the Cold Lake Air Weapons Range located 20 km to the north and the Cold Lake IR149B located 32 km to the east (Figure 1).

14.0 Biophysical Setting

14.1 The Air

Air quality is important for living things, including the health and well-being of humans, wildlife and vegetation. Climate change has been linked to the release of GHGs to the air. The air in the area is clean and is typical of a rural or remote area. The natural sounds heard in the Project area include wind blowing through the trees and animal sounds.

14.2 The Land

The land in the area is currently a grazing lease used mostly for cows. The land is mainly pasture with some wetlands. Lands around the Project are tame pasture and natural, including forests, swamps and water bodies. Most of the land in the area is used for grazing, and oil and gas activity (e.g., wellsites, access roads, pipelines and seismic lines; Figures 5 and 6). There is an electrical substation to the west, across Range Road 61A. One residence is located approximately 900 m southwest of the disturbance area. The nearest water bodies are Osborne Creek and Marguerite Lake.

14.3 Soils

Existing data were used to conduct a review of baseline soil and terrain conditions in the disturbance area. Soils in the area are generally of poor capability and consistent with soils in northeast Alberta. Upland soils tend to be rapidly

drained while soils in depressions are imperfectly to poorly drained. Federation completed a total of 12 soil inspection points.

The topography in the Project area comprised a rising and falling landscape, with slopes ranging from 0 to 2%, including four distinct depressions. Parent materials comprise several, often contrasting, layers of till deposits ranging in texture from sand to clay. Sandy soils are more susceptible to wind erosion. Soils with clay content are less susceptible to water erosion.

14.3.1 Soil Impacts

The following Project-related activities may adversely affect soils and terrain:

- Source well drilling
- Clearing and grading
- Stripping and grading
- Excavation and installation of foundations
- Cavern well drilling and solution mining
- Operations and maintenance
- Regrading
- Soil replacement
- Revegetation

Potential Project-related effects on soils and terrain include:

- Loss of soil during salvage, handling and storage
- Reduction of topsoil quality due to mixing of subsoil with topsoil
- Loss of topsoil due to wind or water erosion
- Loss of soil quality due to compaction and puddling

Key mitigation measures to reduce the Project-related effects on soils and terrain include:

- Minimizing the disturbance area
- Revegetating and reclaiming areas that are no longer required
- Using qualified personnel to supervise soil handling activities (e.g., salvage, storage and replacement)
- Pumping surface water from depressions into vegetated areas at a low release rate prior to soil salvage
- Salvaging upper subsoil separately from topsoil
- Stockpiling topsoil and subsoil for use in reclamation
- Preventing the mixing of topsoil and subsoil
- Placing stockpiles away from natural drainage channels
- Managing stockpiles to prevent erosion and weeds
- Using appropriate equipment

Based on the implementation of these mitigation measures and the use of best management practices, the Project is not expected to have high impact on soils and terrain.

14.4 Surface and Ground Water

Provincial databases and literature sources were reviewed for the desktop analysis. The site is located within the southern portion of the Marguerite Upland and elevations range from 560 to 650 metres above sea level (masl). Shallow groundwater conditions are typical for this area of Alberta. Groundwater levels depend on precipitation for recharge and levels are expected to fluctuate on a seasonal basis. Groundwater levels will be highest after periods of heavy rain and snowmelt.

There are 28 water wells within a 5 km radius of the site including:

- Five observation and monitoring wells
- Six domestic wells
- Eight stock wells
- One domestic and stock well
- One domestic and irrigation well
- One industrial well
- Six wells classified as other

Water well depths range from approximately 12 to 143 m. The Project is located within the Middle Beaver River Watershed and surface water generally drains to the southwest. The disturbance area is relatively undeveloped with the presence of low-lying shallow waterbodies and rolling pasture.

The following Project-related activities may affect groundwater and surface water quality or quantity:

- Source well drilling
- Clearing
- Stripping and grading
- Excavation and installation of foundations
- Cavern well drilling and solution mining
- Cavern testing and de-watering
- Operations and maintenance
- Removal of equipment and well closure
- Regrading
- Soil replacement
- Revegetation/seeding

14.4.1 Surface and Ground Water Impacts

Potential Project-related effects on groundwater and surface water include:

- Change in groundwater quality due to saltwater spills, fuel spills or other chemical spills
- Reduction of groundwater levels because of wetland clearing, dewatering activities and withdrawal of water from the source wells
- Increased cloudiness, increased suspended sediments (e.g., clay, silt and sand particles) or contaminants in surface water
- Alteration of surface drainage

Key mitigation measures to reduce the Project-related effects on groundwater and surface water include:

- Developing and applying a groundwater monitoring program
- Following the EPP measures and emergency plans for spill prevention and containment
- Constructing containment to maintain the reliability of the cavern
- Limiting the drainage of wetlands for water
- Following the wetland mitigation measures in the EPP
- Constructing a runoff pond or sedimentation pond designed to current best practices
- Developing a stormwater management plan

Based on the implementation of the mitigation measures, the Project is not expected to have high impacts to surface or groundwater.

14.5 Wetlands

Provincial databases, aerial photography and literature sources were reviewed for existing data on wetlands. A total of six wetlands are in the Project area (Figure 6). Four wetlands occur within the disturbance area: a permanent shallow open water/seasonal marsh/dugout complex, a seasonal marsh and two temporary marshes. Two additional wetlands occur outside the disturbance area but within 100 m of the disturbance area. A man-made dugout also occurs within 100 m of the disturbance area.

The wetlands within the disturbance area are D (low) value. Indirect impacts are unlikely to occur for wetlands outside the disturbance area as they are not connected to the disturbance area. Federation has received approval to alter the four wetlands within the disturbance area.

14.5.1 Wetland Impacts

The following Project-related activities may impact wetlands:

- Clearing
- Stripping and grading
- Excavation and installation of foundations
- Operations and maintenance
- Regrading
- Soil replacement
- Revegetation/seeding

Potential Project-related effects on wetlands include:

- Loss of wetland function (approximately 1.75 ha)
- Alteration of wetland function

Key mitigation measures to reduce the Project-related effects on wetlands include:

- Using erosion and sediment control measures
- Installing containment measures as required
- Storing soil piles away from wetlands
- Restoring natural drainage
- Maintaining an emergency spill kit
- Ensuring equipment is clean
- Preventing deleterious substances from contaminating surface water or groundwater resources

All four wetlands within the disturbance area will be permanently affected by construction of the Project. Project activities will result in permanent loss of wetland function and wildlife habitat within the impacted wetlands. The total wetland area affected is 1.75 ha. Federation has paid wetland replacement fees for the permanent loss of wetlands within the disturbance area.

Based on the application of the mitigation measures (including compensation for wetland replacement), the Project is not expected to have high impacts to wetlands.

14.6 Vegetation

The desktop analysis consisted of a review of Provincial and Municipal databases, imagery and literature sources. Most of the disturbance area is pasture (87%). Four wetlands occur within the disturbance area (approximately 1.75 ha or 13% of the disturbance area), and an additional two wetlands occur within 100 m. One upland forested ecosite was found within 100 m, north and southeast of the site No rare plant species or communities were observed within the disturbance area.

14.6.1 Vegetation Impacts

The following Project-related activities may affect vegetation species and communities:

- Clearing
- Stripping and grading
- Operations and maintenance
- Revegetation/seeding

Potential Project-related effects on vegetation species and communities include:

- Loss or change of vegetation community

- Introduction and spread of weeds
- Introduction and spread of clubroot

Key mitigation measures to reduce the Project-related effects on vegetation include:

- Minimizing the disturbance area
- Using existing trails
- Seeding soil stockpiles with appropriate vegetation to protect them from erosion
- Ensuring all equipment is clean prior to arrival
- Stabilizing stockpiles to prevent wind or water erosion
- Seeding soil stockpiles as soon as possible
- Removing and destroying weeds, especially before roots and seeds spread
- Replanting with native seed mixes during decommissioning (depending on the end land use)
- Limiting grazing on the reclaimed area during the first growing season
- Monitoring reclaimed and restored areas

Based on the implementation of the mitigation measures, the Project is not expected to have high impacts to vegetation.

14.7 Fish and Fish Habitat

The desktop analysis consisted of a review of Federal, Provincial and Municipal databases, and literature sources. No fish-bearing lakes or important aquatic habitat were identified within the disturbance area or within 100 m of the disturbance area. There is an unnamed waterbody located 200 m east of the disturbance area. Marguerite Lake, located 2.5 km northeast of the Project, is the closest fish bearing lake (supporting fish for all or part of the year). Highbank Lake, 4.6 km to the southeast, provides the closest aquatic habitat (based on available substrate and habitat complexity). No fish inventory or stocked inventory (according to a search of the Fish and Wildlife Internet Mapping Tool) was identified within 5 km of the disturbance area (Government of Alberta, 2023b).

There are no drainages, watercourses or hydrological connectivity to other watercourses or fish-bearing waterbodies within the Project, apart from the dugout that is intermittently connected to one wetland. As a result, no direct impacts to fish or fish habitat are expected due to the Project. The topography of the Project area slopes from northeast to southwest. Therefore, surface water from the site (if left unmitigated) would potentially flow to the southwest, away from Marguerite Lake to the northeast and the unnamed waterbody to the east. With the implementation of mitigation measures for groundwater, surface water and wetlands, no effects to fish habitat are expected.

14.8 Wildlife

The desktop analysis consisted of a review of Federal, Provincial and Municipal databases, and literature sources. Field surveys were conducted to determine the wildlife and wildlife habitat present on-site or within the surrounding area. Field surveys included Breeding Bird, Sharp-tailed Grouse, Raptor Nest, Amphibian and Winter Tracking Surveys.

A total of 29 different bird species were observed at three survey points. The most commonly observed birds were American Robin (*Turdus migratorius*), Clay-colored Sparrow (*Spizella pallida*), Wilson's Snipe (*Gallinago delicata*), and Red-winged Blackbird (*Agelaius phoeniceus*). No active nests were observed. No Sharp-tailed Grouse were heard or leks (mating display areas) observed during the Sharp-tailed Grouse surveys. There were also no incidental observations of Sharp-tailed Grouse during the other field surveys.

No active raptor (birds of prey) nests or raptors were identified during the Raptor Nest Survey. Raptors observed during the other field surveys included Northern Harrier (*Circus hudsonius*), Swainson's Hawk (*Buteo swainsoni*), Turkey Vulture (*Cathartes aura*), and Red-tailed Hawk (*B. jamaicensis*).

During the amphibian surveys, Boreal Chorus Frog (*Pseudacris maculata*) and Wood Frog (*Lithobates sylvaticus*) were heard calling.

During the Winter Tracking Surveys, tracks observed included Coyote (*Canis latrans*), Snowshoe Hare (*Lepus americanus*), Red Fox (*Vulpes vulpes*), Red Squirrel (*Sciurus vulgaris*), Moose (*Alces alces*), Ruffed Grouse (*Bonasa umbellus*) and White-tailed Deer (*Odocoileus virginianus*). Striped skunk (*Mephitis mephitis*) were observed incidentally during the other field surveys. None of these species are considered rare or endangered.

No important wildlife habitat or wildlife features were noted during the field surveys.

14.8.1 Wildlife Impacts

The following Project-related activities may affect wildlife and wildlife habitat:

- Source well drilling
- Pre-construction surveys
- Clearing
- Stripping and grading
- Excavation and installation of foundations
- Equipment installation
- Cavern well drilling and solution mining
- Operations and maintenance
- Removal of equipment and well closure
- Regrading
- Soil replacement
- Revegetation/seeding

Potential Project-related effects on wildlife and wildlife habitat include:

- Habitat loss, loss of connection between habitats and/or breaking habitat into smaller parts
- Change of movement patterns
- Increase in wildlife mortality or injury

Key mitigation measures to reduce the Project-related effects on wildlife and wildlife habitat include:

- Using existing disturbed areas (protecting undisturbed areas)
- Conducting nest and wildlife searches prior to construction
- Applying timing restrictions and buffers around important features (e.g., nests) that are appropriate for each species
- Minimizing noise
- Minimizing light
- Containing and removing wastes
- Reducing vehicle speeds
- Fencing
- Reclaiming and re-vegetating areas that are no longer required

Based on the implementation of mitigation measures, the Project is not expected to have high impacts to wildlife and wildlife habitat.

14.9 Species at Risk

There are no drainages, watercourses or connections to other watercourses or fish-bearing waterbodies within the Project area. Therefore, the disturbance area does not provide habitat for fish, aquatic or marine species at risk (SAR).

No plant SAR have been documented within the disturbance area (Alberta Conservation Information Management System, 2022). No rare plants or rare plant communities were identified during the vegetation survey.

There are 23 historical records of wildlife SAR observed within 5 km of the Project area (Government of Alberta, 2023b). Eleven wildlife SAR were observed during the field surveys. Nine of these species are listed only as "Sensitive" in Alberta. The other two species, Common Nighthawk (*Chordeiles minor*) and Barn Swallow (*Hirundo rustica*) are listed as "May be at Risk" in Alberta and as "Threatened" under Schedule One of the SARA (Government of Alberta, 2022a; Government of Canada, 2021a). There were no other sensitive wildlife habitats or features identified in the Project area.

14.9.1 Species at Risk Impacts

The following Project-related activities may affect SAR and SAR habitat:

- Source well drilling
- Pre-construction surveys
- Clearing
- Stripping and grading
- Excavation and installation of foundations
- Equipment installation
- Cavern well drilling and solution mining

- Operations and maintenance
- Removal of equipment and well closure
- Regrading
- Soil replacement
- Revegetation/seeding

Potential Project-related effects on wildlife SAR and wildlife SAR habitat include:

- Habitat loss, loss of connection between habitats and/or breaking habitat into smaller parts
- Change of movement patterns
- Increase in wildlife mortality or injury

Key mitigation measures to reduce the Project-related effects on wildlife SAR and wildlife SAR habitat include:

- Using existing disturbed areas (protecting undisturbed areas)
- Conducting nest and wildlife searches prior to construction
- Applying timing restrictions and buffers around important features (e.g., nests) that are appropriate for each species
- Minimizing noise
- Minimizing light
- Containing and removing wastes
- Reducing vehicle speeds
- Fencing
- Reclaiming and re-vegetating areas that are no longer required

Based on the implementation of mitigation measures, the Project is not expected to have high impacts to SAR and SAR habitat.

14.10 Air Quality

The air assessment consisted of air modelling, focussed on nitrogen dioxide (NO_2) and ammonia (NH_3) emissions. All sources of emissions during the construction and operations phases were considered. Emissions were determined and then compared to background (i.e., baseline) conditions and the Alberta Ambient Air Quality Objectives (AAAQO) for NO_2 and NH_3.

Background NO_2 concentrations were taken from the Lakeland Industrial Community Association, Cold Lake South Station, located 42 km southeast of the Project, for 2019 to 2021. Background NH_3 concentrations were taken from the Wood Buffalo Environmental Association, Patricia McInnes station, located in Fort McMurray about 240 km north of the Project, for 2019 to 2021. This is the closest location that continuously measures NH_3.

The modelling results indicate that the routine and non-routine (emergency) operation of the Project will comply with the AAAQO for NO_2 and NH_3. Figures 7 and 8 display the predicted concentrations of NO_2 and NH_3 in the area of the Project during operation. Pre-construction, construction, operations and decommissioning/reclamation

activities all may affect air quality. Potential Project-related effects on air quality include a decrease in air quality due to equipment emissions and dust.

14.10.1 Air Impacts

Key mitigation measures to reduce the Project-related effects on air quality include:

- Maintaining exhaust systems
- Controlling dust and odour emissions
- Avoiding burning of construction debris
- Limiting traffic
- Avoiding the idling of vehicles
- Conducting air emissions monitoring

The Project will regularly use a process called Selective Catalytic Reduction (SCR) with NH_3 to reduce harmful emissions known as Oxides of Nitrogen (NOx). Based on the application of these measures and the modelling results indicating the Project will comply with the AAAQO for NO_2 and NH_3, the Project is not expected to cause high impacts to air quality.

14.11 Noise

Environmental noise limits for the utility sector in Alberta are regulated by the AUC (Alberta Utilities Commission, 2021). The Project is located entirely within the M.D. of Bonnyville so the Project must also comply with Noise Control Bylaw/1657.

The noise impact assessment was conducted by examining all potential noise sources and sound power levels from the Project components and comparing that noise to baseline noise conditions, as well as the daytime and nighttime noise standards set by AUC Rule 012 (Alberta Utilities Commission, 2021). Operation of the plant may be 24 hours per day, so the plant noise levels were compared against the more stringent nighttime recommended level of 40 A-weighted Decibel (dBA). dBA is the scale to used to measure sound level as heard by the human ear. There are many existing energy-related facilities near the Project, all with the potential to generate significant environmental noise. This includes the Marguerite Lake substation and several well pads. Following AUC requirements, sound levels were assessed including existing noise sources.

A noise model for the Project was developed which included each source of noise. Other factors considered included:

- Topography (e.g., hills, valleys, rivers)
- Reflecting objects (i.e., objects that bounce noise back)
- Obstacles that shield or block noise
- Ground absorption
- Atmospheric effects (e.g., wind, temperature, humidity)
- Source direction

Sound levels were calculated at the nearest residence, located approximately 900 m to the southwest of the Project. The nearest residence is where people are most likely to be affected by sounds from the Project.

A noise contour map illustrating the calculated sound levels at varying distances from the Project and the nearest residence (R1) is shown on Figure 9. The calculated sound level at the nearest residence was below the recommended level. As 40 dBA is the Rule 012 Nighttime permissible sound level, the calculated sound levels follow this standard.

14.11.1 Sound Level Impacts

Major noise sources during Project operations are noises that escape from buildings, usually through the walls, roof, building inlets and exhaust ventilation openings. Facility noise sources include the expander train, the compressor train, the aerial cooler and the instrument air building. Other sources of noise include the water heat recovery unit, the generator step up transformer, the air inlet filter face, the compressor transformer and the aerial cooler intake and discharge.

Key mitigation measures to reduce the effects of noise include:

- Enclosing equipment within acoustic buildings that include absorptive interior liners and exhaust ventilation silencers
- Maintaining equipment in good working order
- Limiting construction activities to daylight hours
- Following local noise by-laws
- Applying for a noise exemption if construction activities cause too much noise

Based on the use of these measures, sound levels from the proposed Project will meet both the daytime and the nighttime permissible sound levels at the nearest residence. The estimated sound level at the nearest residence is below the nighttime permissible sound level of 40 dBA. The Project will meet permissible sound levels and is not expected to cause high impact to sound levels.

15.0 Heritage, Human Health, Social and Economic Conditions

15.1 Historical Resources

The Project does not cross any lands with a Historic Resource Value (HRV). Lands with a HRV contain or have a high potential of containing a historic resource. Historic resources could be archeological, palaeontological, evidence of Indigenous traditional land use (e.g., burials, ceremonial sites) or historic structures.

Potential Project-related effects to historic resources could include damage, disturbance, deterioration or destruction. These effects could occur due to land disturbance and the transformation of natural landscapes during site vegetation clearing, stripping and grading; source well drilling; and drilling of the cavern wells, disposal wells and the observation well. A Historical Resources Impact Assessment (HRIA) was completed and an application for *Historical Resources Act* Approval was submitted. *Historical Resources Act* approval was granted.
Federation and its contractors will immediately stop activities if a potential historic resource is encountered. The area will be marked and the Heritage Division of Alberta Culture and Status of Women will be contacted for further

instruction. The chance discovery of historic resources will be reported to the contacts identified in the Standard Requirements within the *Historical Resources Act* approval.

Based on the limited potential for significant historic resources in the area and Federation's procedure for chance finds or encounters, the Project is not expected to cause significant effects to historical resources.

15.2 Human Health

Federation reviewed the human health characteristics of local and regional populations such as life expectancy, causes of death, most common diseases and birth rate for the Bonnyville Local Geographic Area (LGA), see Table 15.2-1.

Table 15.2-1. Human Health Characteristics of Bonnyville LGA Versus the Province of Alberta

Human Health Characteristic	Bonnyville LGA	Province of Alberta
Life Expectancy in 2018, in years	79.6	81.7
Mortality Rate per 100,000 (2019-2021)	823.7	700.3
Obese Adults in 2020	38.2%	28.8%
Good to Excellent Mental Health during the COVID Pandemic	69.1%	72.1%
Birth Rate Per 1,000 Women	22.4	23.1
Teen Birth Rate per 1,000 Women	11.7	6.9
Infant Mortality Rate in 2019	4.2	4.5
Infant Mortality Rate in 2020	6.7	5.3

Sources: Government of Alberta, 2022c, Government of Alberta, 2023

The top cause of death from 2011-2021 was disease of the circulatory system. More than three-quarters of all reported deaths were due to four major causes: diseases of the circulatory system (29.7%), neoplasms (i.e., abnormal masses, 27.6%), injuries (10.3%) and diseases of the respiratory system (8.8%). In 2020, the disease with the highest prevalence rate (per 100 population) in Bonnyville was hypertension. The rate associated with this disease was 1.2 times higher than the provincial rate (25.6 versus 20.6; Government of Alberta, 2022c).

The nearest hospital to the Project is the Bonnyville Healthcare Centre located approximately 40 km or 29 minutes south of the Project. The preliminary design of the Control/Admin Building for the Project includes a first aid room with a gurney/laydown area. The nearest fire department (Station #6) is in the Hamlet of La Corey, Alberta, approximately 17 km south of the Project. The nearest RCMP detachment is in Bonnyville, approximately 21 km away.

Federation has created an Emergency Response Plan (ERP) to ensure that it effectively responds to any on-site emergencies. Project information was sent to the M.D. of Bonnyville on November 18, 2022, and Federation will continue consultation with the M.D. regarding the ERP. All impacted stakeholders within the ERP radius will be provided with a copy of the ERP.

The air modelling results indicate that the routine and non-routine (emergency) operation of the Project will comply with the AAAQO for NO_2 and NH_3 (Section 14.10). Thus, air quality for local residences is not expected to be affected.

With the recommended noise mitigation measures installed, Project sound levels will comply with both the daytime and the nighttime allowable sound levels, as per AUC Rule 012, at the nearest residence (Section 14.11).
The Project is not expected to cause a change to human health, either locally or regionally, as air, water and sound quality will be monitored and maintained within Provincial limits. The Project is also not expected to burden the local medical facilities, pharmacies and fire departments. Federation has an excellent safety record and has carefully considered Project design to ensure safe working conditions.

15.3 Social and Economic Conditions

15.3.1 Cities, Towns and Hamlets

The Project is located 16 km north of the Hamlet of La Corey, Alberta, within the M.D. of Bonnyville. La Corey is the closest community to the Project. The nearest town with full services is Bonnyville, Alberta, located approximately 34 km to the south of the Project.

According to the municipal census, the population of La Corey was 59 in 2014 (M.D. of Bonnyville, 2014). The nearest town is Bonnyville, population 5,915 in 2022 (Government of Alberta, 2022b). The population of the M.D. of Bonnyville was 13,085 in 2022 (Government of Alberta, 2023c). The nearest city is Cold Lake, located 34 km to the southeast. The population of Cold Lake was 15,546 in 2022 (Government of Alberta, 2023d).

15.3.2 Transportation Network

Range Road 460, Highway 41 (Buffalo Trail) and Highway 55 are the major transportation routes for the Hamlet of La Corey (Figure 1). Access to the Project is via Highway 41, north of Bonnyville through the Hamlet of La Corey on the Range Road 60, Township Road 640, Range Road 62 and Range Road 61a for approximately 19 km.

Project-related traffic will include lowboy trucks carrying various pieces of heavy equipment and light pick-up trucks. The Project will cause a short-term increase in local vehicle traffic during construction.

15.3.3 Land Use

Existing land uses within the Hamlet of La Corey include agriculture, commercial, residential and industrial uses (M.D. of Bonnyville. 2022). The Project disturbance area is entirely within public (provincial Crown) land and common industrial land uses near the Project are grazing and oil and gas activity (Figure 5).

End land use following closure and reclamation of the Project is anticipated to be pasture or hayland. Following reclamation, Federation will conduct a post-construction reclamation assessment within a year (growing season) and provide specific recommendations for further reclamation measures if necessary. Roads and permanent erosion and sediment control structures may be left in place at the request of the land manager.

15.3.4 Labor and Economy

The M.D. of Bonnyville consists mostly of farmland and large areas of natural parkland and lakes. The main forms of industry are agriculture, oil and gas, and forestry. Construction, transportation, tourism, service and retail, and government offices also add to the economy (Town of Bonnyville, 2023). The surrounding lakes provide recreational opportunities.

The average employment income for a full-time worker in the M.D. of Bonnyville in 2020 was $57,600, with an average total household income of $130,400 (Statistics Canada 2021). Industry in the M.D. of Bonnyville is dominated by agriculture, oil and gas, tourism and community services (Town of Bonnyville, 2023).

The Project will play an important role in the local economy by providing jobs, potentially benefiting both local and Indigenous community members. Also, Federation will use local businesses and suppliers where possible and this will add money into the local economy. The Project is expected to bring up to 200 full-time jobs during construction and up to 20 full-time operations jobs. The M.D. of Bonnyville will receive financial benefits in the form of taxes related to the Project. The Project will have a positive effect on the local economy in terms of salaries, use of local services and supplies, and taxes.

15.3.5 Social and Economic Effects

The largest age group in the Local Geographic Area (LGA) in 2021 was 35 to 64 year olds, accounting for 40.6% of the population (Government of Alberta, 2022c). Children 17 and under made up 24.4% of the population, which is higher than the provincial average (22.0%). Individuals 65 and older accounted for 12.9% of the population in the LGA versus 14.1% in Alberta. Bonnyville had a higher proportion of First Nations and Inuit people compared to Alberta (8.7% versus 2.8%). The percentage of female lone-parent families was lower than the provincial average (9.6% versus 11.0%; Government of Alberta, 2022c). The most common non-official languages spoken at home in the LGA were: Tagalog (Pilipino), Filipino, Aboriginal languages, Afrikaans, Sinhala (Sinhalese) and Arabic (Government of Alberta, 2022b). However, the LGA had a lower proportion of non-English and non-French speaking people compared to Alberta (0.3% to 1.4%; Government of Alberta, 2022c).

The Project is not located near residences, schools, public spaces, recreational areas or other services. The nearest school is in Iron River, 10 km west of La Corey, Alberta. La Corey is home to the Willow Prairie Senior Citizens Club, 16 km south of the Project. The Bonnyville Senior Citizens Drop-In Centre is in Bonnyville, Alberta, approximately 34 km south of the Project.

Federation will continue to engage with Indigenous communities throughout the Project and will incorporate feedback on how to employ local people and/or use local services for the Project. Federation is committed to an inclusive and diverse workforce. However, the potential employment of local diverse and vulnerable populations is limited and short-term as the Project only requires 200 full time employees during construction and 20 full-time employees during operations. The Project is not anticipated to disproportionately affect any groups based on gender, culture or identity.

PART D: FEDERAL, PROVINCIAL, TERRITORIAL, INDIGENOUS AND MUNICIPAL INVOLVEMENT

16.0 Federal Financial Support

Federation does not require Federal financial support and no Federal financial support is planned during the Project.

17.0 Use of Federal Lands

No Federal lands will be used for the Project. The Project is located entirely within provincial Crown land.

18.0 Applicable Jurisdictions and Regulatory Requirements

No Federal licences or permits are required for the Project. The Project may require a Federal Impact Assessment. Mitigation measures will be applied so that the Project meets the terms of the MBCA, the *Fisheries Act* (Government of Canada, 2019b) and SARA.

The Project must also follow or obtain Provincial and Municipal permits, licences or authorizations, as indicated by EPA, AUC, Alberta Historic Resources Management Branch, Alberta Ministry of Indigenous Relations, and the M.D. of Bonnyville. Federation has received a letter from EPA stating that an Environmental Impact Assessment Report is not required for this Project (Lori Havanka, EPA Approvals Program Manager, personal communication, May 2, 2023).

Federation will obtain all necessary permits, licences and authorizations prior to beginning construction. See Section 3.1 for additional details of discussions with regulatory stakeholders.

PART E: POTENTIAL EFFECTS OF THE PROJECT

19.0 Effects Related to Federal Acts

Environmental assessment and regulatory requirements related to the Project may fall under Federal legislation, including Project-related effects on:

- Fish and fish habitat – F*isheries Act* (Government of Canada, 2019b)
- Species at risk – SARA (Government of Canada, 2002)
- Migratory birds – MBCA (Government of Canada, 1994)

19.1 Fish and Fish Habitat

The *Fisheries Act* (Government of Canada, 2019b) protects freshwater and marine fish and fish habitat through the prevention of serious harm to fish and by preventing the harmful alteration, disruption or destruction (HADD) of important aquatic habitat. There are no drainages, watercourses or connection to other watercourses or fish-bearing waterbodies within the disturbance area, apart from the man-made dugout that occasionally is connected to one wetland. So, there are no direct pathways for activities within the disturbance area to affect fish or fish habitat. Indirect impacts to wetlands outside the disturbance area are unlikely as they are not connected to the disturbance area. In addition, the topography of the area would result in any runoff from the site (if left unmanaged) flowing to the southwest rather than to the north and east, where the nearest waterbodies are located, as described below.

The nearest watercourses or water bodies to the Project are Osborne Creek and Marguerite Lake located approximately 0.5 km northwest and 2.5 km northeast of the disturbance area. Marguerite Lake is the closest waterbody to the disturbance area which is known to have fish present (Government of Alberta, 2023b). No fish inventory or stocked inventory have been documented within 5 km of the disturbance area (Government of Alberta, 2023b).

The route of the powerline connecting the exiting substation and the proposed substation has not yet been finalized but will be approximately 500 m long and require a small number of poles/towers. The poles/towers will be placed to avoid watercourses and waterbodies and, therefore, the powerline is not expected to cause effects on fish or fish habitat. The existing substation (an incidental project component) is not expected to be expanded in order to connect to the new powerline. Therefore, no potential pathways to affect fish and fish habitat are likely to occur at the existing substation.

A gas pipeline will be required to supply natural gas to the expander generators. This pipeline has potential for effects to fish and fish habitat. Although the footprint has not yet been finalized, the pipeline will be a small diameter, and no new land will be required for the pipeline. It is expected that, due to the small size and location, impacts to drainages and watercourses will be reduced by having construction equipment install the pipeline from the existing road. This avoids the need for a travel lane or any temporary crossings during construction. In addition, depending on the location of the pipeline, it may be possible to avoid changing any existing culverts and avoid impacts to drainages which cross the roadway. If culverts, drainages or watercourses that cross the existing roadway cannot be avoided or if it is not possible to cross them using a trenchless method (drilling or boring underground), mitigation to reduce impacts to watercourses, as well as fish and fish habitat may be needed. Key mitigation measures could include: obtaining approvals and permits, using trenchless crossings, crossing when watercourses are dry or frozen, preventing harmful substances from entering watercourses, preparing for accidental spills, storing materials away from watercourses, pausing construction when poor weather may cause sediment to enter watercourses and limiting clearing of vegetation near watercourses. Once the pipeline route has been finalized, site-specific mitigation will be confirmed.

No impacts to fish or fish habitat are expected and, therefore, the provisions of the *Fisheries Act* do not apply.

19.2 Species at Risk

The SARA (Government of Canada, 2002) prevents species from becoming extinct by providing legal protection and by conserving biological diversity (i.e., variety of life forms). The SARA also recommends recovery plans for SAR. SARA prohibits killing, harming, harassing, capturing and the take of species listed under the Act.

Threats to aquatic SAR or marine plant SAR include those that might cause serious or irreversible damage or harm, either to individuals or their critical habitat (Government of Canada, 2002). Osborne Creek and Marguerite Lake do not provide important aquatic habitat (Government of Alberta, 2023b). The nearest waterbody containing important aquatic habitat is Highbank Lake, 4.6 km southeast of the Project. As described in Section 19.1, there are no drainages, watercourses or connection to watercourses or waterbodies containing important habitat for aquatic species that the Project will affect directly. Thus, there is no direct pathway for activities within the disturbance area to affect aquatic species or marine plants. Therefore, impacts to aquatic SAR or marine plant SAR are not expected.

SAR are not typically found in areas of large industrial or agricultural activity. Much of the land use in the Project area is industrial and agricultural, so SAR are not expected to be present. Federation has completed a desktop review and field surveys for potential SAR within the disturbance area (see Section 14.9). With the use of mitigation

measures and best management practices developed specifically for individual SAR species, the Project is not expected to cause high impacts to terrestrial (that is living mostly on land) SAR.

19.3 Migratory Birds

The MBCA (Government of Canada, 1994) protects and conserves migratory birds. This includes populations, individuals, nests and eggs. Migratory birds have the potential to occur and nest within the disturbance area. To mitigate the effects on migratory birds, clearing will occur outside of the main nesting period for migratory birds in the area (i.e., April 1 to August 30). If clearing or construction must occur during this period, nest and wildlife searches will be completed prior to clearing or construction. If a nest or potential wildlife feature is discovered, an appropriate buffer will be established and maintained until the young have left the nest or the area has been cleared by a biologist. Migratory birds such as ducks, geese and gulls may be attracted to the stormwater pond. Federation will monitor the stormwater pond to ensure that birds are not landing on the pond and being harmed. With the use of mitigation measures and best management practices, the Project is not expected to cause high impacts to migratory birds.

20.0 Effects to Federal Lands or Cross Boundary Effects

The Project is not located near any provincial or international borders (Figure 1):

- The Alberta-Saskatchewan border is 51 km east of the Project
- The Alberta-British Columbia border is 593 km west of the Project
- The Alberta-Northwest Territories border is 603 km north of the Project
- The Canada-USA International border is 622 km south of the Project

The nearest Federal land is the Cold Lake Air Weapons Range, located 20 km north of the Project.

Most Project-related effects will occur within the disturbance area. Given the distance of Federal lands and borders from the Project, the potential for the Project to have a direct effect is limited to non-existent.

There is potential for some indirect effects to extend outside of the disturbance area. Most effects (e.g., land use, terrain, soils, wetlands, vegetation) are not expected to extend more than 100 m from the edge of the disturbance area. Indirect effects that could extend more than 100 m include the spread of weeds, effects to Wetland 1, effects to surface water, effects on wildlife, air emissions (Figures 7 and 8) or noise. Noise and air emissions have the potential to be the most far ranging of the effects listed. Noise would be less than 35 dBA 2 km from the edge of the disturbance area (Figure 9). The Alberta Air Quality Model Guideline provides direction on when to include other emissions sources and states that “all industrial emission sources within 5 km of the Project boundary must be included in the modelling assessment” (Government of Alberta, 2021). Therefore, a distance of 5 km from the Project is considered a reasonable distance to consider indirect or cumulative effects of air emissions.

The potential effects related to the fuel gas pipeline are the effects likely to extend the greatest distance from the disturbance area. The proposed pipeline is expected to extend 14 km north of the disturbance area. The northern end of the fuel gas pipeline, where it ties into the existing pipeline, will not have any emissions sources or lead to any impacts to groundwater. The pipeline will be next to or within existing rights-of-way and clearing will not be

required for the construction of the pipeline. As a result, the most extensive effects from the pipeline tie-in point will be the temporary effects to wildlife during construction. Potential indirect effects on wildlife have potential to extend up to 1 km from the tie-in point and would be mostly resulting from noise during construction. It is assumed that when the pipeline is no longer needed it will be decommissioned in place and any activity at the tie in point to disconnect or isolate the line would be relatively short in duration.

Federation has developed mitigation measures to reduce these indirect Project-related effects. Based on the effect pathways described above, the maximum extent of potential indirect effects would be approximately 5 km extending from the edge of the disturbance area and 1 km extending from the fuel-gas pipeline. These extents do not intersect with any Federal lands or cross any Provincial or National boundaries.

21.0 Effects to Indigenous Peoples Resulting from Changes to the Environment

Changes to the environment can affect Indigenous physical and cultural heritage, the current use of lands and resources for traditional purposes and/or the current use of structures, sites or things that are of historical, archaeological, paleontological or architectural significance. Engagement with Indigenous People, as well as searches of available public information, assists in determining the use and importance of various elements or areas.

21.1 Potential Effects to Indigenous Physical and Cultural Heritage and Land Use

The Project is located on Treaty 10 and Treaty 6 lands. There are 11 groups that have asserted Traditional territory or have traditional land use activities in the Project area. The disturbance area is not within or next to any reserve lands or lands subject to any pending Indigenous land claims or court cases (Government of Canada, 2023b). The nearest reserve is Cold Lake 149B and the nearest Métis Settlement is KMS.

The Project is within Metis Harvesting areas B and D (Métis Nation of Alberta, 2019). Metis harvesting includes fishing, hunting and trapping. No rivers or lakes where Métis Harvesting is permitted are within 10 km of the Project.

The Project is located within the fenced area of Wolf Lake Provincial Grazing Reserve, and the Project occurs in an area that was cleared for grazing around 1973.

During consultation, Indigenous groups identified concerns related to wildlife and wildlife habitat, vegetation, subsistence hunting for large game, surface disturbance, traffic, access, water and cumulative effects (the combined effect of past, present and future activities). Some groups identified that the area has historical and contemporary land use; however, no physical cultural heritage sites were identified during consultation or site visits. Federation understands that the absence of physical cultural heritage within a proposed Project footprint is not to be interpreted to mean that there are no project specific impacts to the exercise of Indigenous Rights.

Indigenous Peoples may be displaced from preferred traditional use areas due to noise, increased worker activity, increased traffic or safety risks. Concerns around noise, vibration, safety risks with the energy storage system, and long-term impacts with the decommissioning and reclamation phases have been identified through consultation. Federation is working to respond to and address these concerns.

One of the considerations when picking the site for the Project was to minimize new access to reduce any impacts

to traditional land uses. The Project is next to an existing highway so no new access is required.

The Project is anticipated to have a limited impact on water and drainage, as well as vegetation and land use. Federation is committed to mitigation measures and best management practices that reduce Project-related effects. This includes careful site design and placement, sediment and erosion control, stormwater management, weed control and reclamation with native seed mixes and vegetation.

Federation has been consulting with Indigenous groups since 2021. On July 20, 2021, consultation was deemed adequate by the ACO. However, CLFN has continued to raise concerns and has provided Federation and the AUC with more detailed information regarding direct and adverse impacts of the Project on its Indigenous and Treaty Rights. Federation will continue to consult with CLFN and other potentially affected Indigenous groups throughout the lifetime of the Project.

21.2 Potential Effects to Indigenous Peoples Resulting from Changes to Structures, Sites or Items of Historical, Archaeological, Paleontological or Architectural Significance

The disturbance area does not contain any structures or buildings. There are no previously recorded sites or structures of historical, archaeological, paleontological or architectural significance known to exist within the disturbance area. A HRIA was completed and an application for *Historical Resources Act* Approval was submitted to the Historic Resources Management Branch, Alberta Culture and Status of Women. *Historical Resources Act* approval was granted for the Project on February 7, 2022.

During site visits with CLFN and FLMS, no physical cultural heritage sites were identified; however, Federation understands that the absence of physical cultural heritage within a proposed Project footprint is not to be interpreted to mean that there are no project specific impacts to the exercise of Indigenous Rights.

The Project has low potential to have significant impact on significant historic resources, based on the review of the archeologist conducting the HRIA for the Project. As a result, the likelihood of an unidentified site or item of historical, archaeological or paleontological significance is low. Therefore, any potential effects to Indigenous Peoples as a result of these potential effects would be unlikely. However, procedures will be followed so that if a contractor sees a potential archeological or paleontological resource, activities will be stopped until the potential resource can be evaluated. The requirements of the HRIA approval also indicate specific reporting procedures in the event that a previously unidentified Aboriginal Traditional Use Site is discovered, the site will be reported to the Aboriginal Heritage Section of Alberta Culture and Status of Women. In alignment with CLFN's request, Federation commits to notify CLFN promptly in case of a chance discovery of an archaeological or paleontological resource, or the discovery of a previously unidentified Aboriginal Traditional Land Use Site.

22.0 Effects to Indigenous Peoples Resulting from Changes to Health, Social or Economic Conditions

22.1 Potential Effects to Indigenous Health

The CLFN Health Centre provides health care services on the CLFN reserve and Dene Wellness provides mental health and substance abuse treatment services to CLFN members. CLFN has an emergency services department, which

provides emergency response service to members on reserve and the local community. The Project would not be expected to access emergency or medical services that are specific to Indigenous communities such as the CLFN Health Centre, Dene Wellness and the CLFN emergency services department. The potential for increased use of emergency services in the region is low due to the emergency and fire equipment that will be available on site as well as the mitigation planning in place to reduce the likelihood and severity should an emergency occur.

No likely potential effects to fish and fish habitat have been identified (see Section 14.7).

Much of the disturbance area is currently used as pasture, the remainder of the area is covered by four wetlands. Due to the ongoing grazing and management within this area, the diversity of species is limited, and some invasive species are present. Indigenous communities have indicated a general concern related to plant harvesting in the area surrounding the Project. During operations, the disturbance area will be graveled. During the decommissioning phase, the Project will be reclaimed. The Project will result in a temporary reduction in the area available for plant harvesting but is not anticipated to cause indirect effects to the health of country foods or the abundance of plants for traditional harvesting outside of the disturbance area due to the mitigation measures that will be implemented.

The potential impacts resulting from the Project to groundwater and surface water will be mitigated by implementing mitigation measures such as: a groundwater monitoring program; containment to guarantee the integrity of the cavern operation; a stormwater management program; construction of a runoff/sedimentation pond and other measures in the Project EPP. As a result of these measures, the potential impacts to ground and surface water will be localized and avoid indirect impacts to water wells and surface water in the area. Therefore, no effects to drinking water used by Indigenous communities are anticipated.

As described in Section 15.2, the Project meets established guidelines for air emissions and noise based on conservative estimates of the air emissions and noise during all phases of the Project.

Visual and noise effects may cause alteration of wildlife movement patterns during construction and operations phases; however, these effects are considered to be of low magnitude following the implementation of mitigation measures and because of the existing disturbance in the area. As a result, the potential effect to game availability in the area is expected to be low in magnitude.

Based on the paragraphs above, though some effects to harvesting are expected, Federation does not anticipate any health impacts to Indigenous Peoples due to the Project.

22.2 Potential for Social Impacts to Indigenous Populations

No increases in the population of the M.D. of Bonnyville are expected as a result of the Project. The workforce is expected to come mostly from the local area, so the Project is not expected to generate a large demand for workers from outside the local area. Therefore, the Project is not expected to change the demographics or composition of people in the local area. As the Project is not expected to cause population growth, reduced access to community services for Indigenous People is not expected.

The Project has been sited to avoid creating new access to previously inaccessible areas. Therefore, the Project is

not expected to increase non-Indigenous use of crown lands. As highlighted by CLFN, Federation acknowledges that its assessment of social impacts on Indigenous Populations is based on Western science-based valued components and indicators. In response to this concern, Federation is committed to continuously engaging with Indigenous groups to gain a deeper understanding of community-specific valued components and indicators related to social impacts and will work towards mitigating direct and adverse social impacts that are identified through this engagement process.

22.2.1 Potential Economic Impacts on Indigenous Communities and Groups

Federation has been building relationships for several years with local Indigenous communities and has been discussing potential for community building and economic opportunities. Positive economic impacts for Indigenous communities, companies or individuals that participate in the Project through business opportunities or employment are expected.

On the basis of the above Sections, Federation does not expect the Project to cause high magnitude negative environmental, health or socio-economic impacts that could potentially affect Indigenous Groups.

23.0 Estimated Greenhouse Gas Emissions

The Project could result in a change in air quality. The use of fuel by construction equipment and land clearing activities could emit GHGs during construction. While in operation, various Project components (e.g., the expander trains, the emergency diesel generator, the fire water pump) could release GHGs. The expander trains account for almost 100% of the predicted emissions. Indirect GHG emissions result from electricity consumption during the construction and operation phase of the Project. A summary of the total GHGs predicted to be emitted during construction and operations is presented in Table 23-1.

Table 23-1. Total Estimated Greenhouse Emissions

Project Phase	Direct Emissions (tonnes)				Third Party/Indirect Emissions (tonnes)	Total Emissions Including Direct and Indirect (tonnes)
	CO_2	CH_4	N_2O	CO_2e	CO_2e	CO_2e
Construction	6,320.38	0.17	0.49	18,947.47	16,000.00	34,947.47
Operation (annual)	77,271.07	1.46	1.30	77,686.00	206,320.00	284,006.00

Note: Operations values are for a single year during operation

Using the 2021 GHG emissions totals for Canada (670,000 ktCO2e) and Alberta (256,400 ktCO2e) as a baseline, the direct emissions (excluding emissions associated with land-use change activities) during the construction phase represents 0.003% and 0.007% of Canada's and Alberta's 2021 total annual GHG emissions, respectively (Environment and Climate Change Canada, 2021).

Using 2021 GHG emission totals for Canada and Alberta as a baseline, the direct emissions during the operation phase represents 0.012% and 0.030% of Canada's and Alberta's 2021 total annual GHG emissions, respectively

(Environment and Climate Change Canada, 2021).

Decommissioning is not expected to occur until the year 2050 or later. At that time, it is highly likely that heavy equipment will use hydrogen fuel cells or electricity rather than natural gas or diesel. Therefore, GHG emissions during decommissioning are expected to be minimal.

Federation is committed to maintaining air quality within the Project area. Federation will conduct continuous air emissions modelling throughout the life of the Project to ensure air quality stays within the provincial guidelines.

The SACC, developed by Environment and Climate Change Canada (Government of Canada, 2021b), has been reviewed and used to calculate GHG emissions associated with the Project. The Project's estimated GHGs meet the standards set in Section 3 and 4 of the SACC. Overall, the GHG emissions associated with the Project are very low in magnitude compared to provincial and national emission totals.

The Project is expected to have a lifespan of at least 30 years and is expected to be in operation from 2028 (or 2030) to 2059 (or 2060). As the proposed Project will be in operation beyond 2050, a formal plan to achieve net-zero emissions by 2050 has been developed in accordance with Section 5.1.4 of the SACC.

The Project is expected to phase out natural gas as the source of energy for powering expander trains and to utilize 100% hydrogen by the year 2035, thereby meeting the nation's net-zero emission goal and in keeping with the goal of the draft Clean Electricity Regulations to reduce GHG emissions from fossil fuel-generated electricity by 2035 (Government of Canada, 2023c).

24.0 Wastes and Emissions

24.1 Greenhouse Gas Emissions

GHG emissions that may be generated by the Project include include CO_2, methane (CH_4), and nitrous oxides (N_2O). Perfluorocarbons (PFC), hydrofluorocarbons (HFC), sulfur hexafluoride (SF_6) and nitrogen trifluoride (NF_3) are not expected to be released by the Project.

GHG emissions for the Project were determined using air modelling. Air modelling was conducted for the construction and operations phases separately, as different equipment is used in each phase.

Construction typically uses diesel-fueled heavy-duty off-road equipment (e.g., drilling rig, tractor, crawler, excavator, scraper, backhoes, truck graders, dozers, compactors, horizontal directional drilling rig, cranes, etc.) and equipment that travels on roads (e.g., pick-up trucks, crew cabs, welder trucks, gravel trucks, fuel trucks, hydro-vac trucks, freight trucks, etc.). Miscellaneous equipment such as propane fueled heaters and diesel fueled light towers were also included in the modeling. The air modelling also considered emissions resulting from land clearing, burning and decay of cleared or burned woody vegetation.

During operations, the Project will use two expander trains running on natural gas, an emergency power generator using diesel and a diesel fired water pump. All other equipment used during operations is electrically driven and does not produce GHG emissions. The expander trains are the main source of air emissions. Federation plans to

transition from using natural gas to hydrogen firing to fuel the expander trains as soon as it is technically possible (approximately 2035). This will significantly reduce the GHG emissions generated by the Project.

Fugitive emissions were also considered. Fugitive emissions are leaks and other irregular releases of gases from pressurized containment structures such as pipelines and storage tanks and areas like connectors, valves, flanges and pumps.

Third party (indirect) emissions were included in the air modeling. Third party emissions include imported electricity that will be used in the wash pumps and other auxiliary utilities during the construction phase. During operations, imported electricity will be used for the electric driven single-125 MW compressor train.

The Project has been designed to stay below the provincial air emissions guidelines. In addition, Federation will ensure that exhaust systems and engines are maintained and kept in good working order. Garbage from construction will not be burned on-site. Personnel will be encouraged to carpool and will avoid idling of vehicles. Continuous air emissions modeling will be conducted to ensure the Project stays within the Provincial guidelines and the conditions of the Project approval.

24.2 Additional Wastes

This section summarizes the additional wastes (heat, liquids and solids) expected to be generated during all phases of the Project.

The process of air compression will result in the production of heat. Federation has selected a closed water and glycol loop equipped with fin/fan aerial coolers. This system would result in a small release of heat to the ambient air during operations.

Brine generated from the salt cavern mining process (during construction) will be disposed of in deep disposal wells. Federation has evaluated the geology of the area to ensure that the disposal wells are in reservoirs deep enough to safely dispose of waste brine without interfering with groundwater and oil and gas production in the area.

Grey water may be generated from use of washrooms and kitchen facilities. Grey water will be trucked off-site and disposed of at an approved waste facility.

A Project stormwater management plan will be developed and implemented prior to construction. The stormwater pond on-site is designed to capture and hold stormwater runoff for a time prior to release. This allows sediments to settle out and provides some treatment for pollutants. Stormwater will be released when it meets the water quality criteria outlined by EPA. Stormwater will be released in a controlled manner to minimize erosion downstream from the release point.

Waste oil will be stored in secure containers, separate from other wastes. Any waste that might be harmful to the environment if released will have secondary containment in place. Quantities of waste oil are expected to be minimal and will be disposed of offsite at an oil recycling facility or an approved licensed disposal facility. All vehicle refueling will occur off-site.

Solid waste generated during construction will include: food wastes and packaging generated by the construction crew, recyclable construction wastes, non-recyclable construction wastes and sewage. Materials used as part of Project activities will be salvaged and recycled whenever possible by a contracted recycling company. Other waste will be disposed of in line with all applicable Provincial and Federal regulations by a contracted waste disposal company. Portable outhouses will be used during construction and will be maintained by a contractor licensed to handle these wastes.

The volume of solid waste generated during operations is expected to be much less than the waste generated during construction. This is due to the nature of the operations activities, as well as the lower number of full-time staff (decreasing from approximately 200 to approximately 20 full time roles). Solid waste generated during operations will include:

- Food wastes
- Paper towels and packaging generated by staff
- Recyclables generated by staff
- Sewage and grey water produced by washroom, kitchen and shower facilities
- Small volumes of non-recyclable waste
- Small volumes of Hazardous waste (e.g., solvents, paint, batteries, fluorescent light bulbs, herbicides, waste oil)

Appropriate contractors will be engaged to remove recyclable and non-recyclable wastes. Any hazardous wastes generated during construction or operation phases will be disposed of at a licensed disposal facility. During operation, sewage and grey water will be held in septic tanks then trucked and disposed of offsite by a third-party contractor.

Once the Project is ready to be taken out of operation, Federation will decommission and reclaim the area as per regulations of the time, the Project-specific approvals and the desired end land use. It is expected that the fuel gas pipeline will be abandoned in place. Wastes generated during pipeline decommissioning may include water, cleaning solution and any residue recovered from the cleaning of the pipeline, as well as any segments of the pipeline, valves or instruments that are removed from the pipeline but can no longer be used elsewhere. The cavern wells will be cleaned, plugged, filled and then cut and capped according to the well type, approval conditions and requirements of the day. Waste generated during cavern well closure may include water, cleaning solution and any residue recovered during well cleaning. The equipment and buildings will be removed; if the equipment and buildings cannot be used elsewhere, any recyclable components or salvageable materials (e.g., metals) will be brought to an appropriate facility. The fence will be removed and the gravel will be salvaged. The site will be re-graded and topsoil and subsoil piles will be redistributed.

The reclamation process is expected to produce minimal wastes but may include a small amount of packaging and construction debris. As with wastes generated during construction and operation, materials will be hauled off-site and any materials that cannot be sold, salvaged or recycled will be disposed of at an appropriate facility and according to the regulations of the day.

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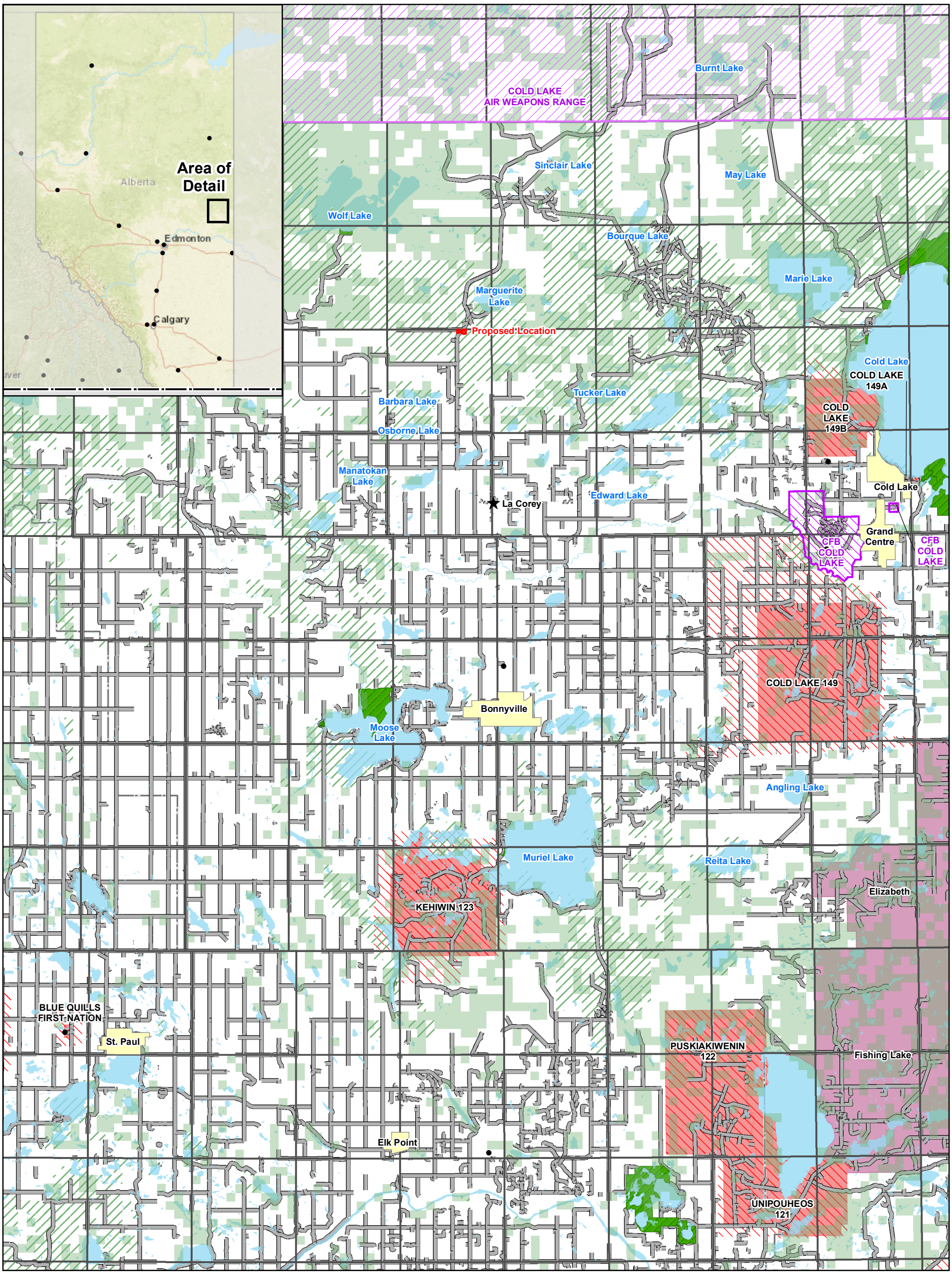
26.0 Limitations

This report has been prepared for the sole benefit of Federation Group Inc. (Federation). This document may not be used by any other person or entity, except for the Impact Assessment Agency of Canada, without the express written consent of Vertex Professional Services Ltd. (Vertex) and Federation. Any use of this report by a third party, or any reliance on decisions made based on it, or damages suffered because of the use of this report are the sole responsibility of the user.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted scientific practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgement of Vertex based on the data collected during the assessment. Due to the nature of the assessment and the data available, Vertex cannot warrant against undiscovered environmental liabilities. Conclusions and recommendations presented in this report should not be considered legal advice.

FIGURES



VERTEX

0 5 10 Km

NAD 1983 UTM Zone 12N

Date: Oct 20/23

N

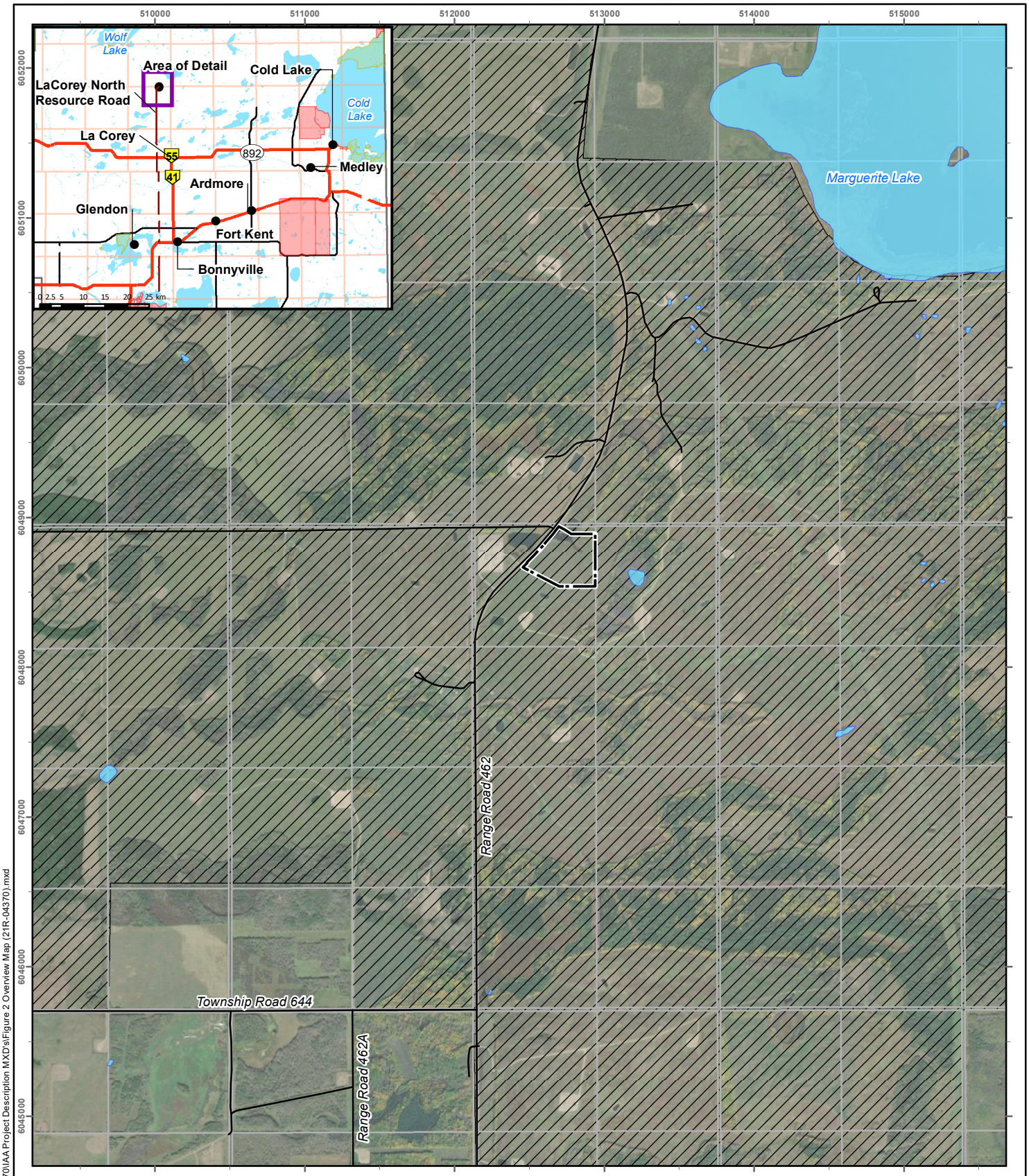
Regional Location
Sec.35 Twp.64 Rge.06 W.4M.

FIGURE: **1**

FEDERATION GROUP INC.

Note: Georefrenced image from Esri, 2017. Features from Alberta Environment and Parks, Government of Alberta, 2022-2023. Federal crown land from Esri, 2019. Provincial ESAs (2014) from ACIMS, 2022. Airports locations from University of California, 1945. Vertex Professional Services Ltd., 2023.

Document Path: G:\1-Projects\Federation\21R-04370\IAA Project Description MXD's\Figure 1 Regional Location (21R-04370)_Rev2.mxd



Road
Disturbance Area
First Nation Reserve
Parks and Protected Areas
Quarter Section
Waterbody
Wolf Lake Provincial Grazing Reserve Boundary

VERTEX

0 200 400 800 m

Bonnyville No. 87
NAD 1983 UTM Zone 12N
Date: May 01/23

N

Overview Map
Sec.35 Twp.64 Rge.06 W.4M.

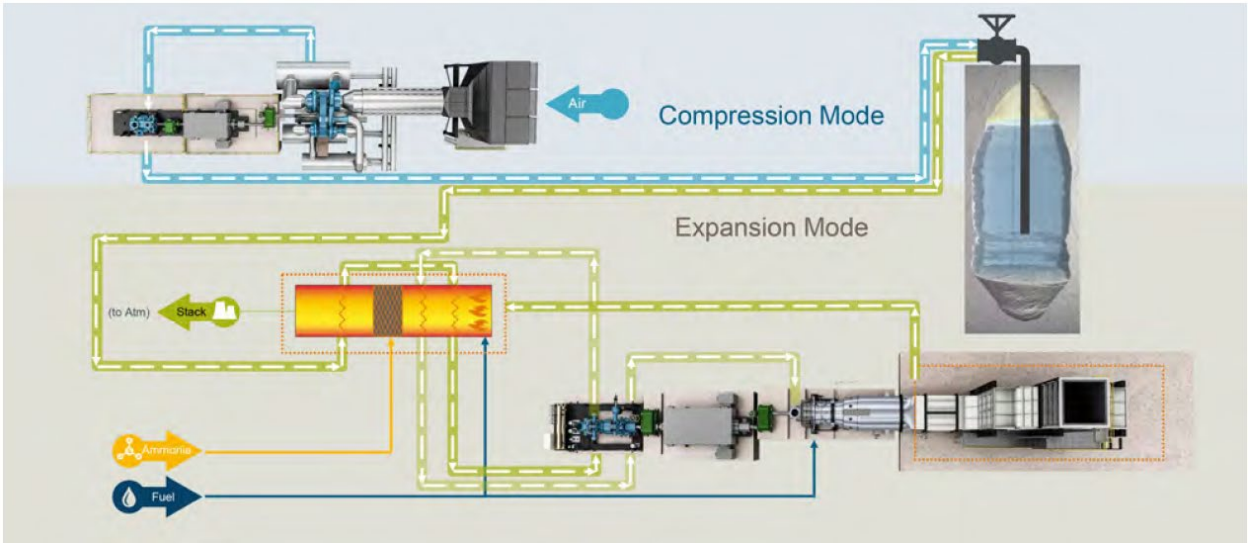
FIGURE:
2

FEDERATION GROUP INC.

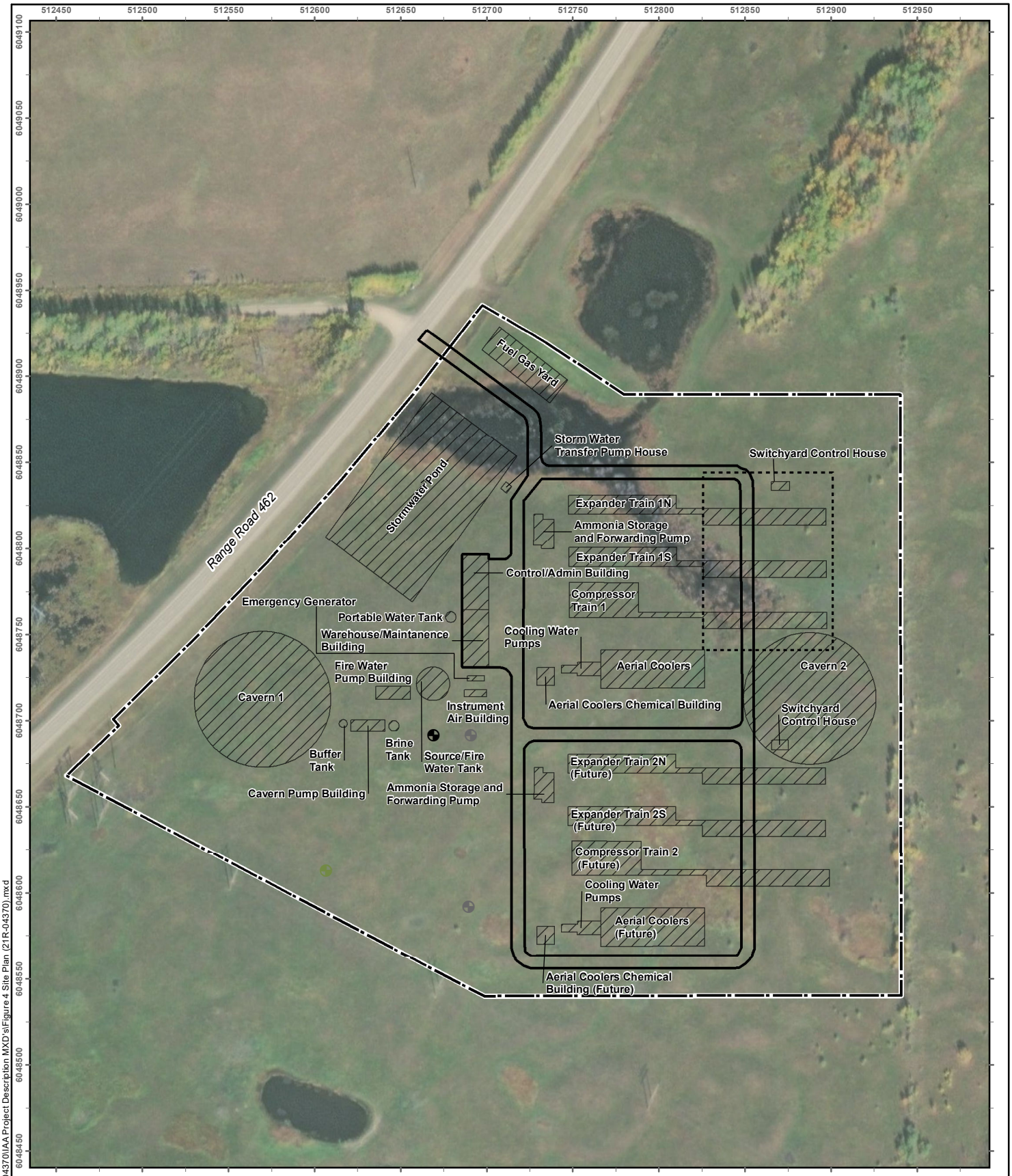
Document Path: G:\1-Projects\Federation\21R-04370\IAA Project Description MXD's\Figure 2 Overview Map (21R-04370).mxd

Note: Image acquired by ESRI, 2020. Wolf Lake Grazing Reserve boundary, Government of Alberta, 2017. Base hydrography, protected parks and First Nation reserve data from Alberta Environment and Parks, Government of Alberta, 2022. Vertex Professional Services Ltd., 2023.

Figure 3.Overview of the Compressed Air Energy Storage Process



Source: Siemens Energy, 2021



VERTEX

0 15 30 60 m

Scale: 1:3,000

NAD 1983 UTM Zone 12N

Date: Jul 17/23

N

Site Plan

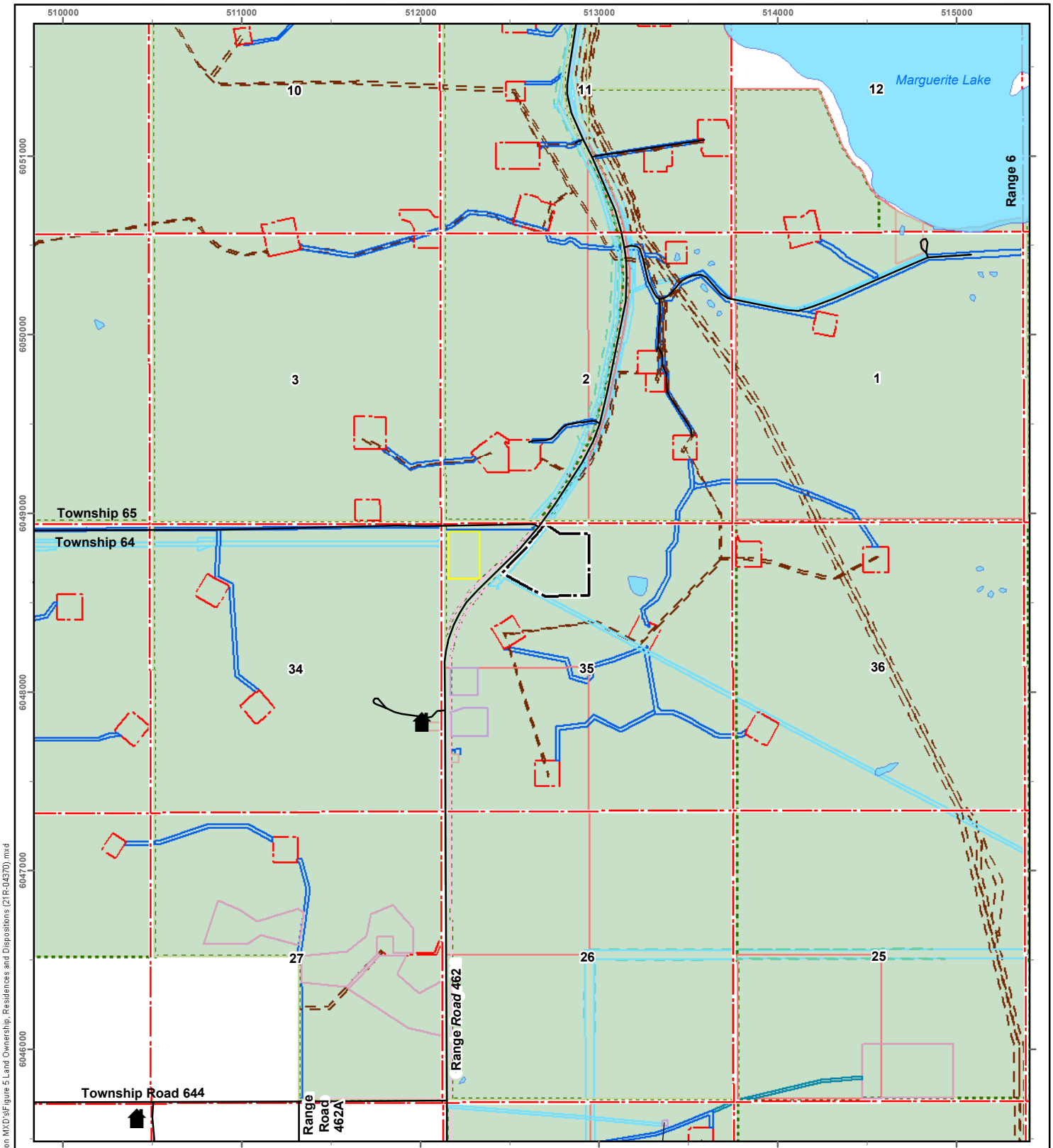
Sec.35 Twp.64 Rge.06 W.4M.

FIGURE: **4**

FEDERATION GROUP INC.

Note: Georefrenced image from Esri, 2020. Feature locations from AUC application, 2023. Vertex Professional Services Ltd., 2023.

Document Path: G:\1-Projects\Federation\21R-04370\IAA Project Description MXD's\Figure 4 Site Plan (21R-04370).mxd



VERTEX

0 175 350 700 m

N

NAD 1983 UTM Zone 12N

Date: Nov 22/23

Land Ownership, Residences and Dispositions
Sec.35 Twp.64 Rge.06 W.4M.

FIGURE: 5

FEDERATION GROUP INC.

Geospatial data presented in this figure may be derived from external sources and Vertex does not assume any liability for inaccuracies. This figure is intended for reference use only and is not certified for legal, survey, or engineering purposes.

Note: Disposition Altalis Ltd., 2022. Base Hydrography from Alberta Environment and Parks, Government of Alberta, 2022. Crown land tile from Dept. Of Sustainable Resources Development, 2005. Residences from site sketch. Site boundary from survey plan. Vertex Professional Services Ltd., 2023.

VERSATILITY. EXPERTISE.

Document Path: G:\1-Projects\Federation\21R-04370\AA Project Description MXD's\Figure 5 Land Ownership, Residences and Dispositions (21R-04370).mxd

Current Wetland Delineation

Disturbance Area

Disturbance Area (100m Buffer)

Sharp-tailed Grouse Survey Area

Vegetation

Aspen Forest

Disturbed

Mixedwood Forest

Pasture

VERTEX

0 25 50 100 m

NAD 1983 UTM Zone 12N

Date: Apr 27/23

N

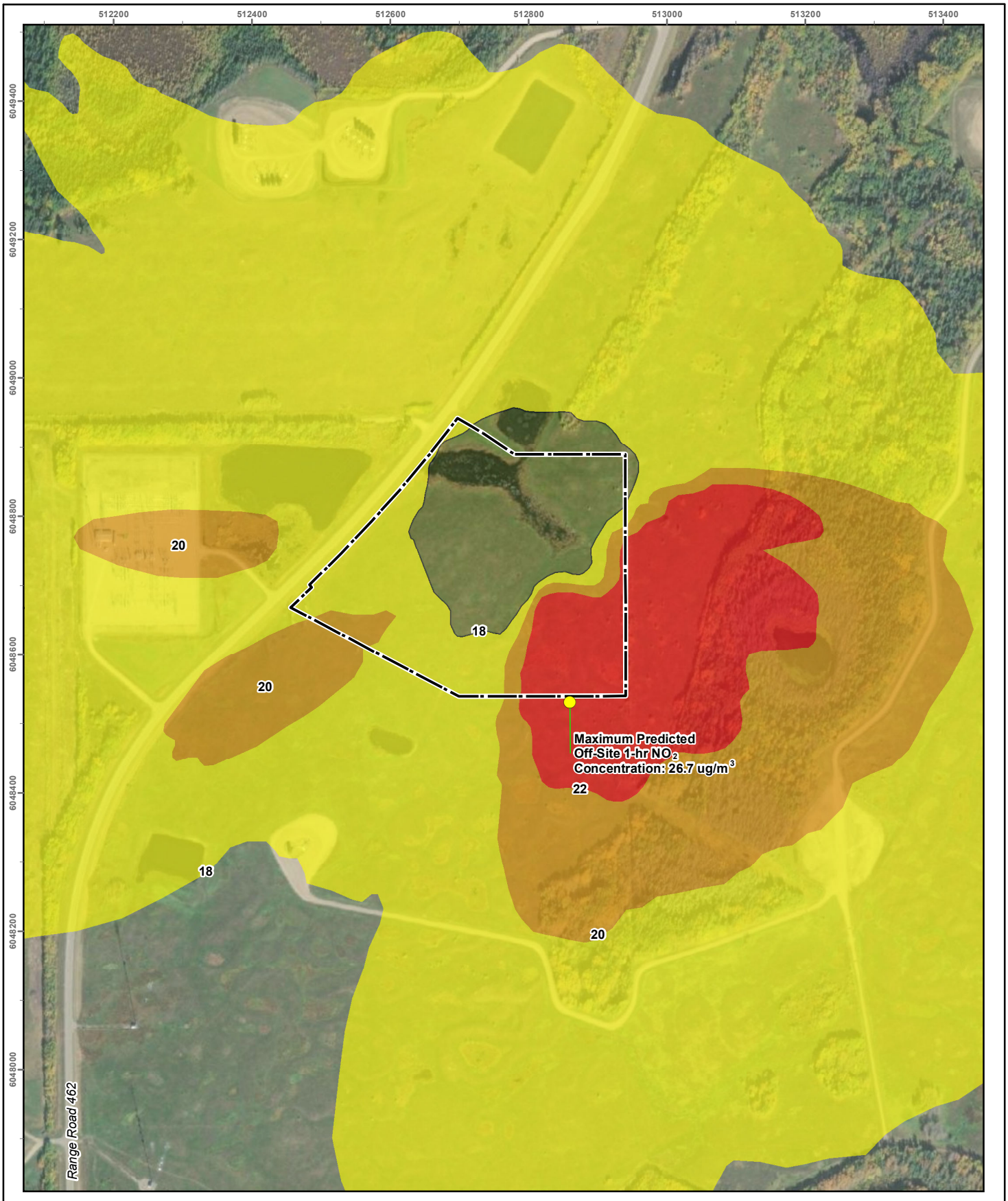
Biophysical Features
Sec.35 Twp.64 Rge.06 W.4M.

FIGURE: 6

FEDERATION GROUP INC.

Note: Image acquired by ESRI, 2020. Sharp-tailed Grouse Survey, Alberta Environment and Parks, Government of Alberta, 2013. Feature locations from Vertex Professional Services Ltd., 2022.

Document Path: G:\1-Projects\Federation\21R-04370\IAA Project Description MXD's\Figure 6 Biophysical Features (21R-04370).mxd



Disturbance Area

0 25 50 100 150 m

NAD 1983 UTM Zone 12N

Date: Apr 27/23

N

Maximum Predicted 9th Highest 1-Hour Average NO_2 Concentration Contours from Operation of the Expander Trains with SCR Based on AERMOD Model Predictions Including Background Concentrations for the Local Area Around the CAES Project

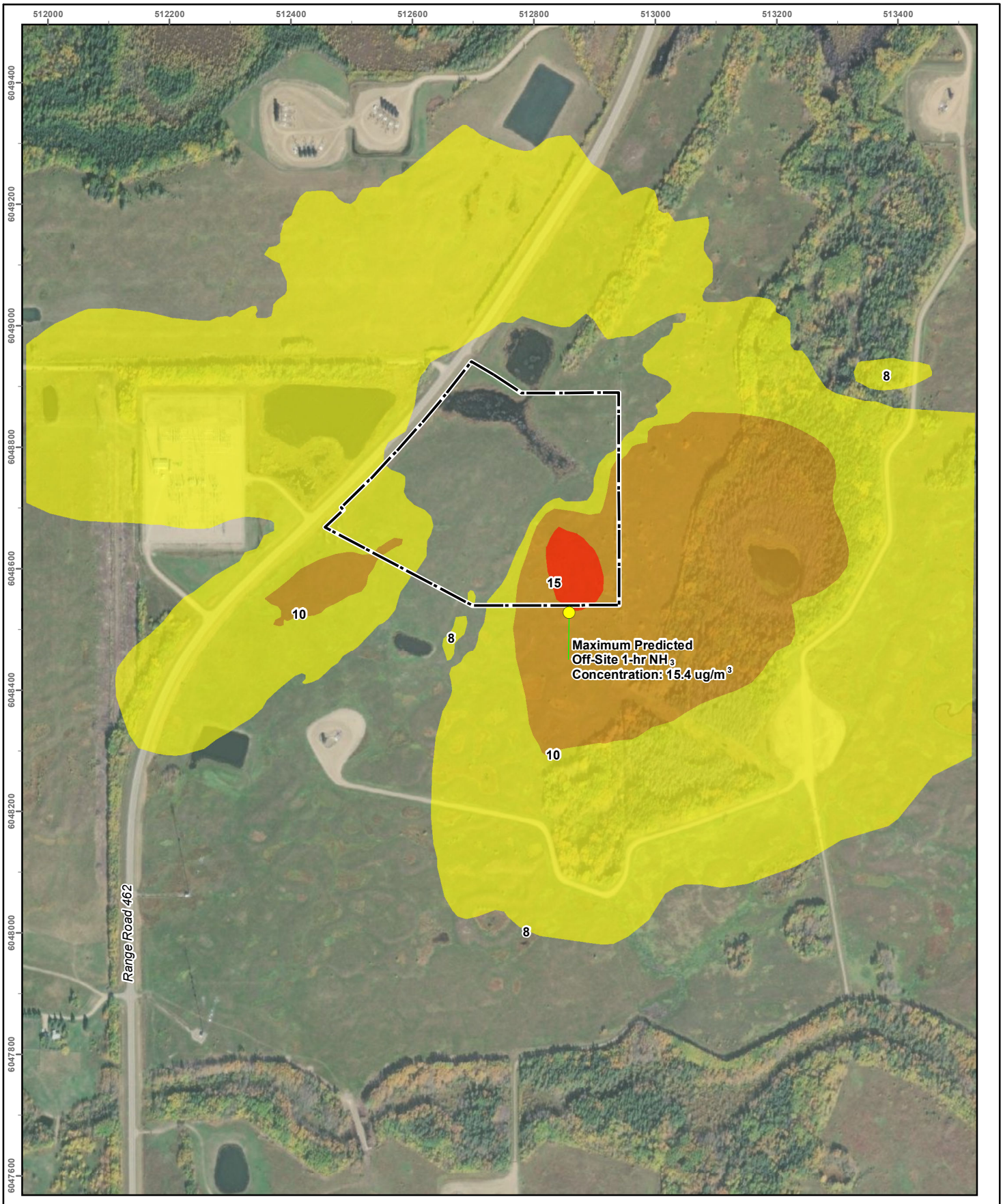
FIGURE: 7

VERTEX

FEDERATION GROUP INC.

Note: Image acquired by ESRI, 2020. Kristofer A. Siriunas (2022). Disturbance area from survey plan. Modelling assessment of the proposed Federation Engineering Compressed Air Energy Storage Project (CAES Project). Sirius Consulting Inc. Vertex Professional Services Ltd., 2023.

Document Path: G:\1-Projects\Federation\21R-04370\IAA Project Description MXD's\Figure 7 Max 1hr Con NO2 Concentrations With SCR (21R-04370).mxd



Disturbance Area

0 50 100 200 m

NAD 1983 UTM Zone 12N
Date: Apr 27/23

N

Maximum Predicted 9th Highest 1-Hour Average NH_3 Concentration Contours from Operation of the Expander Trains with SCR Based on AERMOD Model Predictions Including Background Concentrations for the Local Area Around the CAES Project

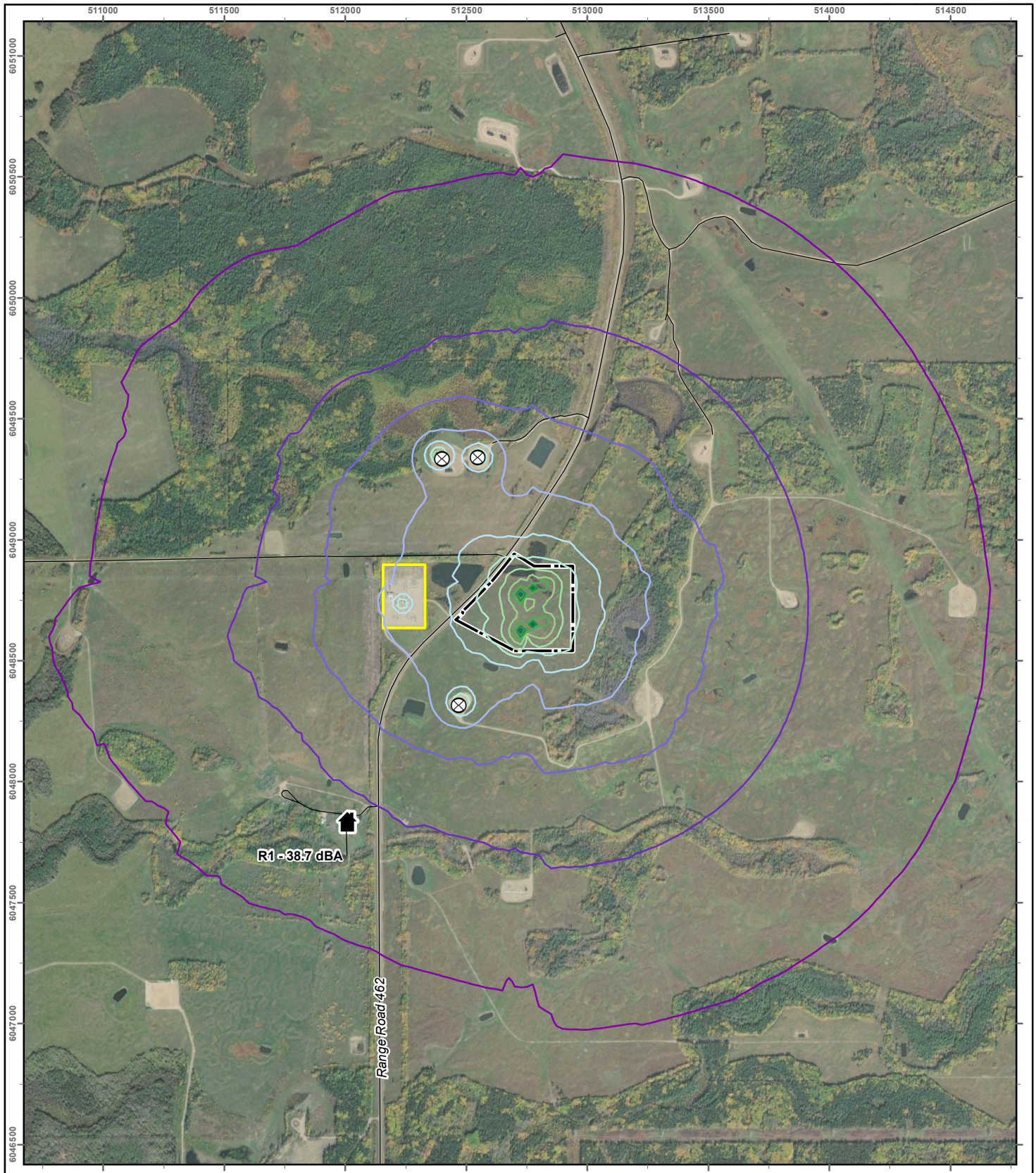
FIGURE: 8

VERTEX

FEDERATION GROUP INC.

Note: Image acquired by ESRI, 2020. Kristofer A. Siriunas (2022). Disturbance area from survey plan. Modelling assessment of the proposed Federation Engineering Compressed Air Energy Storage Project (CAES Project). Sirius Consulting Inc. Vertex Professional Services Ltd., 2023.

Document Path: G:\1-Projects\Federation\21R-04370\IAA Project Description MXD's\Figure 8 Max Nh3 Concentrations With SCR (21R-04370.mxd



CNRL Well Pad

Residences

Road

Disturbance Area

ATCO Marguerite Lake Substation

Noise Propagation Contour (dBA)

035 040 045 050 055 060 065 070 075 080 085

VERTEX

0 125 250 500 m

NAD 1983 UTM Zone 12N
Date: May 03/23

N

Noise Propagation Contour – Application Case
Sec.35 Twp.64 Rge.06 W.4M.

FIGURE: **9**

FEDERATION GROUP INC.

Note: Image acquired by ESRI, 2020. Feature locations from Vertex Professional Services Ltd., 2022. Alberta Utilities C commission (AUC) Permissible Sound Level Determination Receptor R1 AUC Rule 012 Federation Group Inc. Vertex Professional Services Ltd., 2023.

Document Path: G:\1-Projects\Federation\21R-04370\IAA Project Description MXD's\Figure 9 Noise Propagation Contour (21R-04370).mxd