CANADIAN ENVIRONMENTAL ASSESSMENT AGENCY – PROJECT DESCRIPTION
Strathcona Salt Cavern Storage Project

Prepared for:
ATCO Energy Solutions Ltd.

Prepared by:
Stantec Consulting Ltd.

Project Number: 123511289

July 2014

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1.0 General Information and Contact(s)

This Project Description has been prepared in accordance with the *Prescribed Information for the Description of a Designated Project Regulations* and *the Guide to Preparing a Description of a Designated Project under the Canadian Environmental Assessment Act, 2012* (the Guide). The numbers and titles used as main headings in this document align with the Guide for ease of reference.

ATCO Energy Solutions (AESL) builds, owns and operates energy and water-related infrastructure. The company focuses on offering natural gas gathering, processing and storage; natural gas liquids extraction, transportation and services; electric transmission and substations; and industrial water infrastructure solutions to the energy industry. AESL is part of the ATCO Group of Companies, a collection of individual and independent energy, technology, utilities and structures and logistics companies belonging to the broader ATCO Group (ATCO 2014)

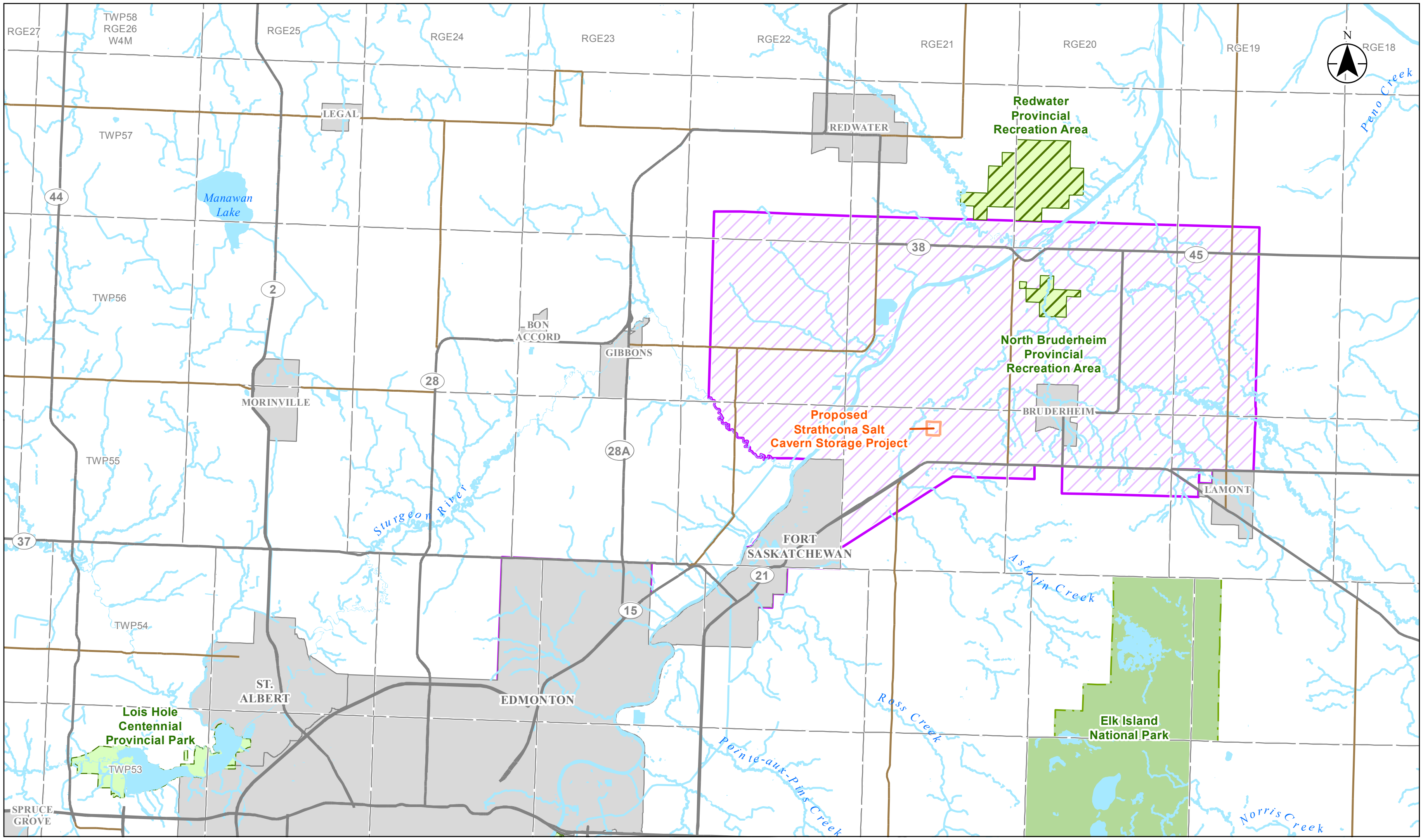
1.1 NATURE AND PROPOSED LOCATION OF PROJECT

AESL is proposing to construct and operate four underground natural gas liquids (NGL) storage caverns and associated surface facilities called the Strathcona Salt Cavern Storage Project (the Project). The NGL products planned for storage in the caverns are ethylene, propane, butane, and condensate. The surface facilities for the Project will be located on a 53.5 hectare (160 acre) parcel of land privately owned by AESL, located at SW 34-55-21 W4M, within the Alberta Industrial Heartland (AIH) near Fort Saskatchewan, Alberta. Figure 1-1 shows the regional setting for the Project.

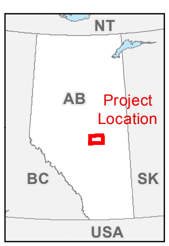
The coordinates of the centroid of the project area are as follows:

- Easting: 365378.506
- Northing: 5962380.709959
- Latitude: 53° 47’ 33.244”
- Longitude: -113° 2’ 37.396”

Figure 1-2 shows land ownership for the Project area, ancillary project infrastructure, and other relevant industrial lands.



Project Area	National Park
Primary Highway	Provincial Park
Secondary Highway	Provincial Recreation Area/ Natural Area
Watercourse	Urban Area
Alberta's Industrial Heartland Boundary	Waterbody



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Reference
ATCO Energy Solutions, Alberta's Industrial Heartland, AltaLIS, GeoLogic, Parks Division - Alberta Tourism, Parks and Recreation

Stantec

ATCO Energy Solutions

Coordinate System
NAD 1983 UTM Zone 12N

123511289-0001
Prepared by CES & AS on 7/22/2014
Technical Review by CS on 7/22/2014

Client/Project
Strathcona Salt Cavern Storage Project

Figure No.
1-1

Title
Regional Area

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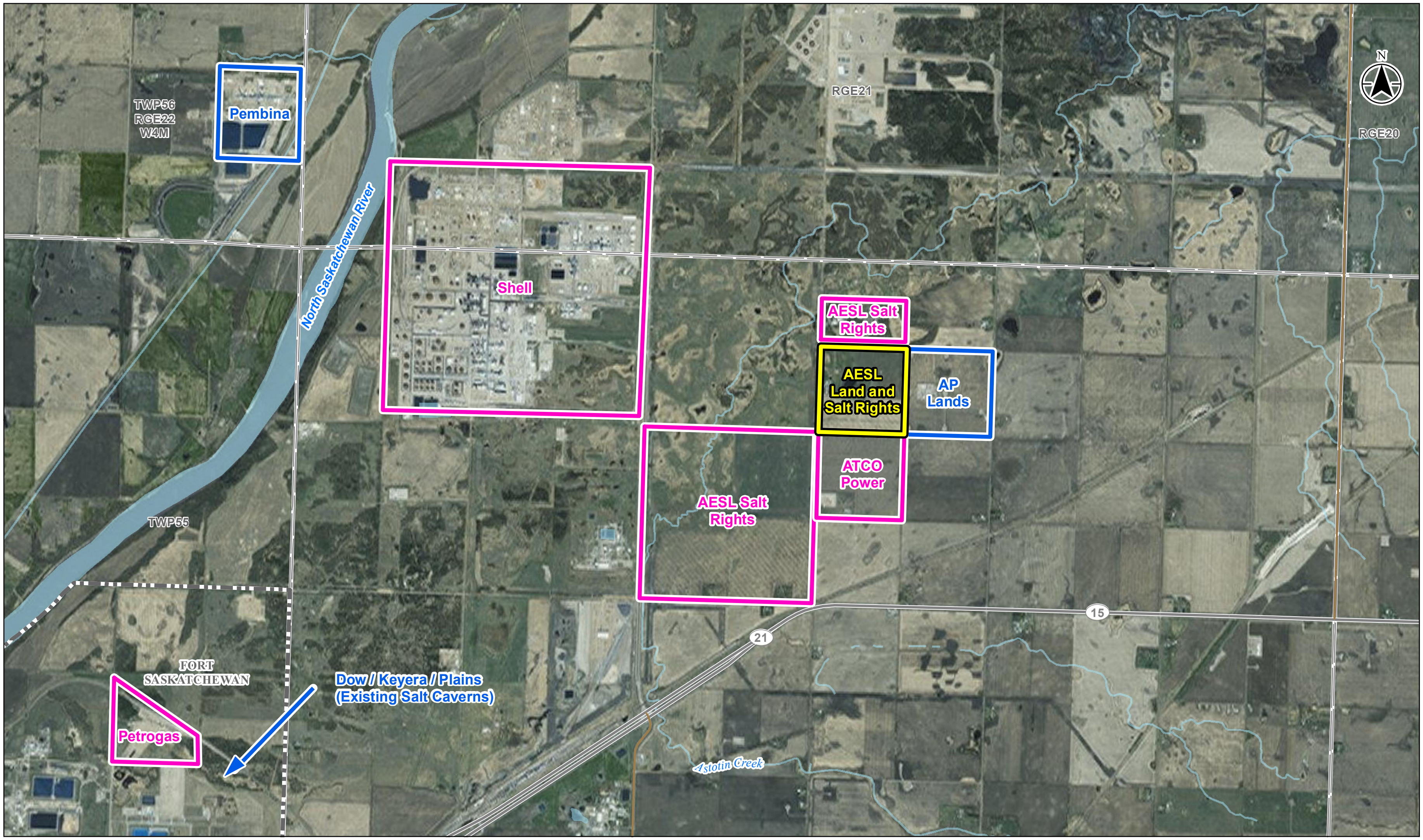

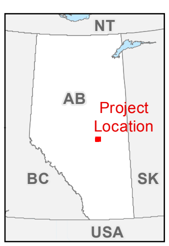

Land and/or Salt Mineral Rights

- Project Location
- Existing Salt Caverns
- Other

- Primary Highway
- Secondary Highway
- Watercourse
- Urban Area
- Waterbody

0 0.5 1 Kilometres

1:55,000 (At original document size of 8.5x11)

Reference
ATCO Energy Solutions, Alberta's Industrial Heartland, AltaLIS, GeoLogic, Parks Division - Alberta Tourism, Parks and Recreation
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Stantec ATCO Energy Solutions

Coordinate System
NAD 1983 UTM Zone 12N

123511289-0010
Prepared by CES & AS on 7/22/2014
Technical Review by CS on 7/22/2014

Client/Project
Strathcona Salt Cavern Storage Project

Figure No.
1-2

Title
Location of Salt Caverns

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Alberta's Industrial Heartland is a joint land use planning and development initiative between five municipalities in the Edmonton Capital Region to attract investment from the chemical, petrochemical, and oil and gas industries to the region. It is a heavily industrialized area that has been specifically designated for industrial use. Land use in the AIH has a strong industrial base of oil and gas processing, chemical manufacturing, hydrocarbon storage and loading facilities including underground salt caverns, and power generation facilities. Future industrial growth in the region is expected to include bitumen upgrading, NGL processing, additional chemical manufacturing facilities, and hydrocarbon storage and logistics terminals.

Offsite NGL pipelines will be constructed, owned and operated by third parties to connect the Project to existing NGL supplies. The NGL pipelines will extend from the Project site, southwest for approximately 11 km, to a Petrogas facility located at SW 24-55-22 W4M, and approximately 3 km west to the Ethylene Delivery System owned by the AltaGas Extraction and Transmission Limited Partnership and operated by NOVA Chemicals. Although the pipeline infrastructure is outside the scope of the Project, a general description is provided in Section 2.0 for reference.

1.2 PROPONENT CONTACT INFORMATION

Name of the designated project: Strathcona Salt Cavern Storage Project

Name of the proponent: ATCO Energy Solutions Ltd.

Address of the proponent:
200, 919 - 11 Ave SW
Calgary, Alberta
T2R 1P3

Chief Executive Officer:
Pat Creaghan
President, ATCO Energy Solutions Ltd.

Principal contact person:
Bob Armstrong
Senior Manager, Project Execution
ATCO Energy Solutions Ltd.
Phone: 403-245-7302
Fax: 403-513-3750
Email: Bob.Armstrong@atcoenergysolutions.com

1.3 LIST OF JURISDICTIONS AND OTHER PARTIES CONSULTED

AESL and ATCO have a strong understanding of the region and presence in the area in which the Project is proposed to be developed. This understanding is based on existing operations, projects currently under construction, and projects in the planning, regulatory approval and assessment phases. AESL continues to work successfully with area stakeholders and the agencies which govern development and operation of oil and gas facilities, as well as water infrastructure projects, within the AIH. AESL intends to build on positive experience and established relationships in the area to progress the development of this Project.

AESL consulted the Canadian Environmental Assessment (CEA) Agency to introduce the Project and determine the need for a project description. The need was confirmed in a letter to AESL dated April 8, 2014 (see Appendix A).

AESL has consulted the Alberta Energy Regulatory (AER) and the Industrial Approvals Branch of Alberta Environment and Sustainable Resource Development (ESRD). As of March 2014, ESRD's Industrial Approvals branch governing oil and gas projects was relocated to the AER making the AER the primary authority for reviewing and approving the key components of the Project. During discussions with AER and ESRD, AESL provided information on the proposed Project scope and schedule, and proposed a regulatory approach to comply with requirements. AESL sought confirmation regarding the regulatory processes and requirements applicable to the Project to ensure compliance as the Project progresses.

Consultation with area stakeholders, including the public, formally began in the third quarter of 2013. Specifically, consultation activities have been developed in accordance with AER Directive 56: Energy Development Applications, and included a public open house and direct resident/landowner consultation and notification. Area consultation will continue over the course of development as required.

A list of the stakeholders consulted for this Project is listed in Table 1-1. Stakeholders who may be potentially affected and/or interested in the Project are identified in Table 7-1.

Table 1-1 Stakeholders Consulted regarding the Strathcona Salt Cavern Storage Project

Federal Government	Canadian Environmental Assessment Agency (CEA Agency)
Provincial Government	Alberta Energy Regulator (AER) Alberta Environment and Sustainable Resource Development (ESRD)
Municipal Government	Strathcona County
Local Landowners, Occupants and Residents	All Landowners, occupants and residents within 1.5 km radius of the Project site at SW 34-55-21-W4M
Regional Associations	Alberta Industrial Heartland Association (AIHA)

1.4 OTHER RELEVANT INFORMATION

1.4.1 Environmental Assessment and Regulatory Requirements of Other Jurisdictions

The Project will be subject to approvals issued by the Alberta Energy Regulator (AER) under the *Oil and Gas Conservation Act* (OGCA), the *Public Lands Act*, the *Environmental Protection and Enhancement Act* (EPEA) and the *Water Act*. The Project will also require permitting under the *Municipal Development Act*.

The salt caverns, brine pond and/or surface facilities for the Project are subject to the following approvals and licenses:

- OGCA requirements under Directive 56: Energy Development Applications and Schedules:
  - A Schedule 2 application is needed for surface infrastructure, including dehydration, pumps and compression.
- OGCA requirements under Directive 65: Resources Applications for Oil and Gas Reservoirs for scheme approval for the salt cavern storage program
- AER Directive 51: Injection and Disposal Wells – Well Classifications, Completions, Logging and Testing Requirements:
  - Test wells must be relicensed for the purpose of injection prior to water injection for cavern development.
  - AESL holds active licenses for two brine disposal wells. No amendments to these licenses will be required for the Project.
- EPEA Approval to construct, operate and reclaim the brine pond, to be issued by the AER under the Industrial Approval Application *(Activities Designation Regulation*).
  - EPEA approvals for industrial projects in Alberta related to wastewater quantity and quality, runoff control, and storm water management will also be administered by ESRD under the EPEA Approval required for the Project.
- Approval as per *Water Act*, *Water (Ministerial) Regulation* for the brine pond, which is considered a dam structure under the *Water Act*
- *Water Act* license requirements for water intake and diversion, and approval requirements to remove a wetland:
  - AESL currently holds a water diversion license for the North Saskatchewan River (NSR) for the stated purpose of mining salt caverns, as required under the *Water Act*. No amendments to the license will be required for the Project.
  - In October 2013, AESL received confirmation from ESRD that one of three wetlands on the Project site was being claimed by the Crown for the purposes of the Project. AESL has submitted an application under the *Water Act* requesting approval to remove one of the non-crown claimed wetlands which falls within the Project development area.

The Project is also regulated by zoning and development permit requirements administered by Strathcona County and the Municipal Development Plan, under the *Municipal Government Act*. Preliminary discussions with Strathcona County have occurred regarding the development

permit requirements and schedule. Considerations include access, road use, utilities and traffic impact.

A Historical Resources Act (HRA) clearance application will be submitted to Alberta Culture for review under the *Historical Resources Act*. The HRA clearance application would encompass all parts of the Project, including the salt caverns, brine pond and surface facilities.

Other provincial regulatory requirements that do not require approvals, permits or authorizations will be adhered to by AESL for the Project. These include:

- Directive 38 – Noise Control
- Alberta *Waste Control Regulation*
- Directive 60 – Upstream Petroleum Industry Flaring, Incinerating and Venting
- Directive 71 – Emergency Preparedness and Response Requirements for the Petroleum Industry

No other federal or provincial approval requirements are anticipated for the Project.

1.4.2 Regional Environmental Studies

A number of environmental studies have been completed in the past several years for the region surrounding the Project location. Many of these studies were done to support environmental impact assessments conducted under the CEAA and relevant Alberta provincial regulation for large scale industrial projects, including:

- Shell's Scotford Complex, including the Scotford Upgrader and the Quest Carbon Capture and Storage Project
- Other upgraders and related projects, including the Total Upgrader, Sturgeon Upgrader, Sasol Gas-to-Liquids Project and the Northwest Redwater Partnership Sturgeon Refinery

At this time there are no regional environmental studies, as defined by the CEA Agency, being conducted for this area.

The Project site, including the underground salt caverns, brine pond, and associated surface infrastructure, are located within the AIH region, 14 km northeast of Fort Saskatchewan and approximately 30 km northeast of Edmonton. The AIH is a joint land use planning and development initiative between five municipalities in the Edmonton Capital Region to attract investment from the chemical, petrochemical, oil, and gas industries to the region.

Land use in the AIH is addressed by an Area Structure Plan Bylaw (Strathcona County 2001) and Amendment (Strathcona County 2002). The Project site is in the Strathcona Heavy Industrial Policy Area as per the AIH Area Structure Plan Bylaw (Strathcona County 2007) and is zoned as "Heavy Industrial" as specified by Strathcona County.

Strathcona County has prepared a Municipal Development Plan according to the legislative framework in the *Municipal Government Act* to manage growth, development and sustainability in an orderly manner for the next twenty years (Strathcona County 2007). The Municipal Development Plan includes specific policies that deal with development near the North Saskatchewan River (NSR) and the conservation and quality of water, land, air and natural resources within Strathcona County.

Under the Alberta *Land Stewardship Act*, a regional management plan for the region of the NSR watershed where the Project is located has been developed but not ratified. ESRD has also developed several regional frameworks for this area as part of the Cumulative Effects Management System, including the Water Management Framework for the Industrial Heartland and Capital Region, the Capital Region Air Quality Management Framework, and an Air Management Framework for the Industrial Air Management Area and Capital Region. In addition, the Northeast Capital Industrial Association (NCIA) has developed a Regional Noise Management Plan and Regional Groundwater Management Plan for the area. Refer to Section 3.1 for details on these plans and frameworks.

The ESRD is currently in the first phase of consultation in the development of the North Saskatchewan Regional Plan (NSRP). The North Saskatchewan Region has approximately 85,780 km^2 (approximately 13%) of Alberta's total land base (ESRD 2012). This region has a large and diverse landscape, a diverse population and a vibrant economy. Industries driving economic activity across the region are growing, and include energy, agriculture, tourism, forestry, and associated services. The purpose of regional planning is to support the numerous policies and strategies that guide natural resource development, support economic growth and protect our environment. Regional plans will integrate these policies and strategies at the regional level and provide the policy direction and clarity for decision makers at the federal, provincial and local levels. Based on Terms of Reference for Developing the NSRP, AESL anticipates that the Project will align with the spirit and intent of the plan.

2.0 Project Information

2.1 PROPOSED DEVELOPMENT

The Project consists of the construction and operation of four underground salt caverns and associated surface facilities and infrastructure for the storage of NGL products. The NGL products proposed to be stored in the caverns are propane, butane, condensate, and ethylene. Each cavern will be developed to a target size of 120,000 m^3 yielding a working storage capacity of approximately 100,000 m^3 per cavern.

All Project facilities are proposed to be developed on land, and with mineral rights, owned by AESL. Two of the four caverns are targeted for commercial operation in the first quarter of 2016. The remaining two are targeted for commercial operation in the first quarter of 2017. The salt caverns will be connected to existing local NGL supply infrastructure through pipelines to be constructed, owned and operated by third parties. As third party infrastructure, they are not within the scope of the Project.

The facilities and infrastructure required for the Project are identified in Table 2-1. New facilities required for the Project are identified in section A and described in Sections 2.3.1.1 to 2.3.1.4. Existing AESL infrastructure which will be used in development is identified in section B and described in Sections 2.1.1 and 2.3.1.5. Information on third party infrastructure is provided in section C and described in Section 2.1.2.

Table 2-1 Components of Proposed Development

Component	Description
A. New AESL Facilities	
Salt caverns and injection wells	Four offset wells (which will fall within the Project scope once they are converted from test wells to injection wells for cavern development, beginning in Q4 2014) Four underground caverns to be developed in the Upper Lotsberg salt formation, approximately 1,800 m below surface Target cavern size – 120,000 m^3 Working cavern storage capacity – approximately 100,000 m^3
Brine pond	Storage pond Capacity- approximately 700,000 m^3
Brine pump house	Piping, pumps, degasification facilities
NGL product handling facilities	Piping, pumps, separators, dehydration units
Cavern washing pipelines	Water and brine pipelines connecting the new cavern wells to existing AESL cavern washing facilities

Table 2-1 Components of Proposed Development

Component	Description
B. Existing AESL Infrastructure	
Cavern washing facility	Water pumps, tank, and piping for water and brine
Brine disposal wells	Two disposal wells completed in the Nisku disposal formation
Water intake and pipeline system	Water intake on the NSR, pumps, and pipeline system
C. New Third Party Infrastructure	
NGL pipelines	Three pipelines of approximately 11 km connecting the Project site to the Petrogas terminal Metering facilities to be located on the Project site
Ethylene pipeline	One pipeline, approximately 3 km in length, connecting the Project site to the existing Ethylene Distribution System pipeline network owned by AltaGas Transmission and Extraction Limited Partnership and operated by NOVA Chemicals Metering facilities to be located on the Project site
Utilities	Natural gas and electricity utility service to the Project site provided by the local franchised utility operators

2.1.1 Existing AESL Infrastructure

The AESL storage caverns will be developed on land adjacent to an existing salt cavern natural gas storage facility owned and operated by ATCO Pipelines. ATCO Pipelines is an independent, rate-regulated natural gas pipeline company within the ATCO Group of Companies. This facility consists of six natural gas storage caverns and related surface operating facilities. Cavern development infrastructure used in the development of these ATCO Pipelines natural gas storage caverns was purchased by AESL and will be used to develop the caverns for the Project. This infrastructure is identified in section B of Table 2-1 and is described in Section 2.3.1.5.

2.1.2 Third Party Infrastructure

Third-party infrastructure will connect the Project to markets and local utilities and is identified in section C of Table 2-1. This infrastructure will be constructed, owned and operated by third parties and is not within the scope of the Project.

- Propane, butane and condensate products will be transported by pipelines constructed, owned and operated by Petrogas. Products will be transported to and from the Project site and the Petrogas terminal. Custody transfer metering will occur on the Project site through Petrogas' metering facilities. Petrogas is a privately held corporation which has provided NGL marketing and supply services across North America since 1986.

- Ethylene product will be transported by a pipeline constructed and operated by NOVA Chemicals, and owned by the AltaGas Transmission and Extraction Limited Partnership. Ethylene product will be transported to and from the Project site and the regional ethylene pipeline system. Custody transfer metering will occur on the Project site through NOVA Chemicals' metering facilities. NOVA Chemicals is a worldwide producer of polyethylene and polypropylene.
- AESL is in discussion with FortisAlberta and the Lamco Gas Co-op for electricity and natural gas service to the Project site.

All required regulatory approvals for the third party connecting infrastructure will be obtained by the third parties constructing, owning and operating the respective infrastructure.

2.1.3 Background: Underground Cavern Development and Operation

Salt caverns are developed in an underground salt layer formation deep below the ground surface. The salt layer is accessed by drilling from the surface down to the required depth in the formation. The well is then completed for water injection, and cavern development can commence, as shown in Figure 2-1. Surface facilities required for cavern development are fresh water pumps and a pipeline from a water source to the cavern wells, a brine disposal pipeline from the cavern wells to the disposal wells, and control fluid handling facilities including a pump, pipeline, and storage tank.

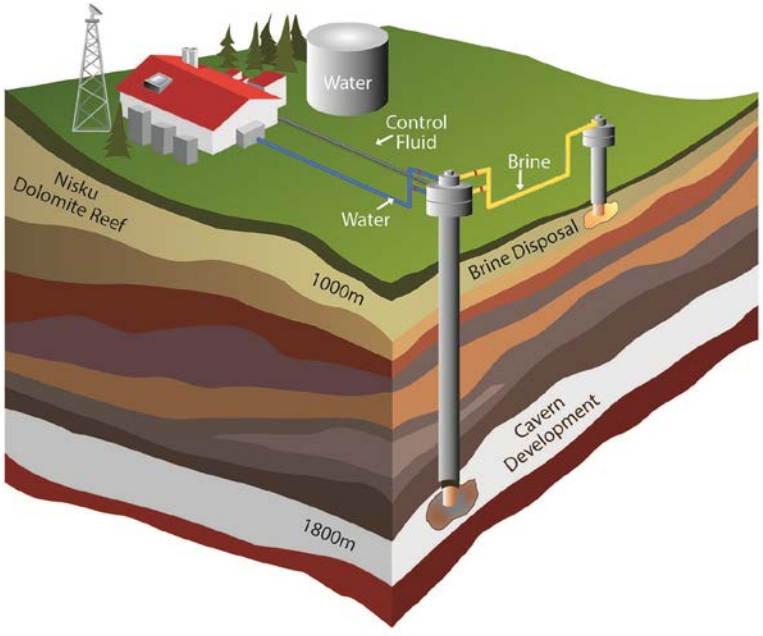


Figure 2-1 Solution Mining Process (not to scale)

A salt cavern is formed by dissolving the natural salt below surface in a process known as solution mining, or cavern washing. This process involves injecting water down a completed well and into the salt layer, where the water dissolves the salt, creating a void (cavern) in the salt layer. As new water is injected, the brine (a solution of salt dissolved in water) that is formed is then displaced back up to surface and down a disposal well (see Figure 2-1 and Figure 1 of Figure 2-2). The disposal well is completed into a disposal formation at a depth significantly below surface to a depth where there would be no interaction with surficial features or fresh groundwater.

At the onset of the development of a cavern, a solution mining program is developed to control the flow of the water to the well to obtain the desired cavern shape. Periodic testing is completed throughout the washing phase to monitor the size and shape of the cavern and evaluate the results of the program.

The control fluid is comprised of a hydrocarbon liquid that is less dense than water which floats on the brine. It is pumped into the cavern during the washing process to help protect and shape the roof section of the cavern. The amount of control fluid used is governed by the wash program, with all of the fluid being removed prior to commencing full storage operations.

The washing process continues until the desired cavern size and shape are obtained. Cavern integrity is then verified, and product storage operations can commence once the product handling surface facilities are completed.

During operation of the storage caverns, saturated brine is used to facilitate the movement of the storage product and ensure that cavern integrity is maintained. The cavern is initially filled completely with brine prior to beginning storage operations. As product is pumped into the cavern, brine is displaced and is stored in a surface level brine pond (shown in Figure 2 of Figure 2-2). When product is withdrawn from the cavern, brine is pumped into the cavern and product is displaced up the storage well to the surface for transport (shown in Figure 3 of Figure 2-2). The cavern is kept full of liquid at all times to maintain pressure in the underground structure and to avoid movement of the salt that could compromise the integrity of the cavern.

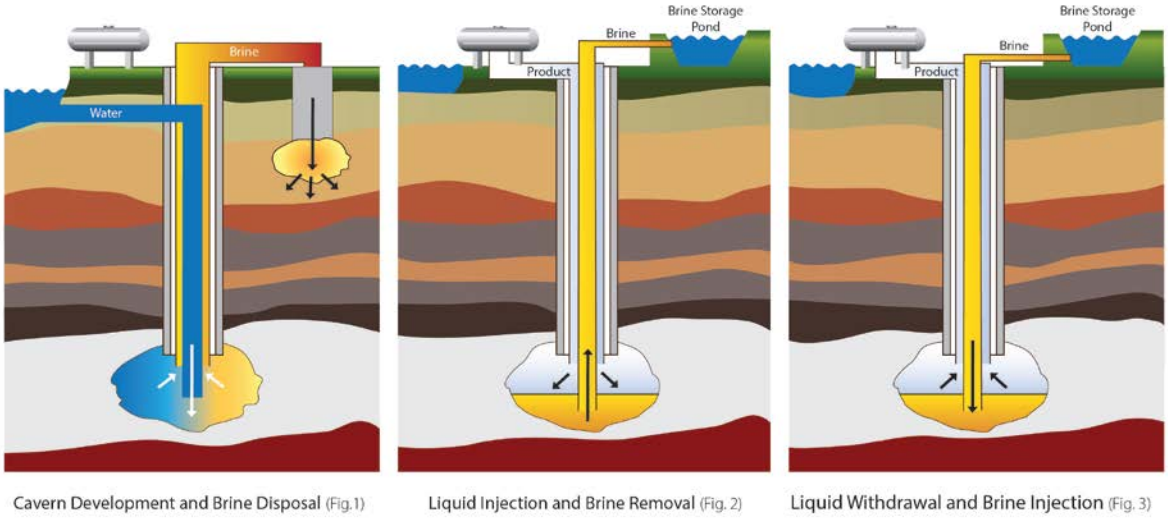


Figure 2-2 Cavern Development and Operation

2.2 DESIGNATED PHYSICAL ACTIVITY

The *Regulations Designating Physical Activities* (the Physical Activities Regulations) prescribe in section 14 (f) of the Schedule of Physical Activities that the construction, operation, decommissioning and abandonment of a new liquefied petroleum gas (LPG) storage facility with a storage capacity of 100,000 m^3 or more is subject to the review of a Project Description under the *Canadian Environmental Assessment Act (CEAA).* Section 14(f) is as follows:

> *14. The construction, operation, decommissioning and abandonment of a new:*
> *(f) liquefied petroleum gas storage facility with a storage capacity of 100,000 m^3 or more*.

The Project, as described, is subject to the review of a Project Description because the NGL products proposed to be stored include LPG products (specifically propane, butane and ethylene, as defined by CEAA), and because the aggregate storage capacity for these products and of the proposed caverns exceeds 100,000 m^3.

2.3 COMPONENTS AND ACTIVITIES

2.3.1 Physical Works Associated with the Designated Project

The physical works for the Project, as identified in section A of Table 2-1, and shown in Figure 2-3 are described in 2.3.1.1 to 2.3.1.4. These physical works will be constructed, owned and operated by AESL. Existing AESL infrastructure, as identified in section B of Table 2-1, and related activities are described in 2.3.1.5.

2.3.1.1 Salt Caverns and Injection Wells

The Project includes the development of four salt caverns in the Lotsberg formation, which is located approximately 1,800 m below surface. Once developed, each cavern will have an approximate total volume of 120,000 m^3, and will have a working NGL product storage capacity of approximately 100,000 m^3.

Four test wells will be drilled by AESL into the Lotsberg formation and will be tested for cavern development. Following testing activities, the results will form part of the application for approval of the storage scheme by the AER. Drilling of the wells has been deemed not to be a Physical Activity as described in the Regulations or incidental to the described activities and as such is outside the scope of the Project (see Appendix A: Canadian Environmental Assessment Agency Letter Regarding Project Review Process).

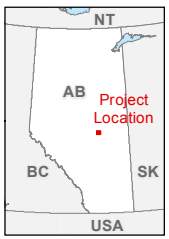
Following AER approval of the storage scheme, the test wells will be converted to water injection wells for cavern development, at which point they will become components of the Project.

2.3.1.2 Brine Pond and Brine Pump House

The brine pond and brine pump house will be used in the operation of the storage caverns.

The brine pond will hold approximately 700,000 m^3 of brine with a nominal depth of 8 m and will occupy an area of approximately 103,000 m^2 (10.3 ha). The brine pond will be surrounded by a fence at the top of the slope to limit access by land animals and people. As brine is displaced into the pond from the caverns, it will flow through a de-gassifier to ensure no NGL products enter the brine pond.

The brine pump house will be constructed on the berm of the brine pond and will be used to withdraw NGL products from the caverns. The brine pump house will contain approximately 560 kW of electrically driven pumps capable of moving up to 1,325 m^3 per hour of brine into the caverns.



- Site Plan - Proposed Facility
- Project Area
- Secondary Highway
- Local Road
- Watercourse

0 100 200 Metres

1:8,000 (At original document size of 8.5x11)

Reference
ATCO Energy Solutions, AltaLIS, CanVec, GeoLogic, Parks Division - Alberta Tourism, Parks and Recreation

Stantec

ATCO Energy Solutions

Coordinate System
NAD 1983 UTM Zone 12N

123511289-0007
Prepared by CES & AS on 7/22/2014
Technical Review by CS on 7/22/2014

Client/Project
Strathcona Salt Cavern Storage Project

Figure No.
2-3

Title
Site Plan

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2.3.1.3 NGL Product Handling Facilities

The NGL product handling facilities consist of pumps and product processing equipment, and related auxiliary facilities required for the delivery of NGL products into and out of the storage caverns. Pumps and product processing equipment include: electrically driven pumps (approximately 8950 kW) for injecting the NGL products into the caverns; filtration and separation equipment to condition the products withdrawn from the caverns; and dehydrators to remove any water from the products prior to delivery to the pipeline systems. The pumps are anticipated to be housed in two buildings of approximately 200 m^2 each. The design capacity is 330 m^3 per hour for each of the NGL products.

Auxiliary facilities will consist of an office, maintenance, electrical and control building. This will be at least one and no more than four separate buildings.

2.3.1.4 Cavern Washing Pipelines

New pipelines, approximately 800 m long for fresh water and shorter pipelines for brine, will be constructed below ground to connect the existing cavern washing facility and brine disposal wells to the new salt cavern wells. These lines will be used in the development and future operation of the salt caverns.

2.3.1.5 Existing AESL Infrastructure and Related Activities

AESL owns and is the operator of an existing cavern washing facility and of associated water and brine pipelines which are located on lands of, and adjacent to the Project. This infrastructure was purchased by AESL in 2012 and was previously owned and operated by ATCO Pipelines for the development of six natural gas storage caverns. The cavern washing facility is housed within a building and contains three electrically driven water pumps that total approximately 1,566 kW.

Fresh water for the cavern washing activities will be provided through an existing AESL owned and operated industrial water system consisting of an intake and pump station on the NSR and a pipeline from the river pump station to the cavern washing facility. The water works and diversion licenses are under *Water Act* Approval numbers 00031016 and 00327841 respectively

Brine generated by the cavern washing activities (solution mine waste) will be disposed through two existing brine disposal wells (license numbers 0098285 and 0097920), owned and operated by AESL and located in SW and SE 34-55-21 W4M. These wells are expected to fully support the development of the caverns for the Project.

No amendments to the existing Water Act Approvals are required to support the development of the caverns for the Project.

2.3.1.6 Physical Activities where CEAA Applies

There are no bridges, dams, marine transport facilities, power plants, or railways as defined by CEAA involved in this designated Project.

2.3.2 Anticipated Size or Production Capacity with Reference to Thresholds set out in the *Regulations Designating Physical Activities*

The target size of each of the four underground storage caverns is 120,000 m^3. Each cavern will have a working storage capacity of approximately 100,000 m^3. Working storage capacity is limited by the sump at the bottom of each cavern, which is taken up by brine fluid, preventing the full cavern volume from being utilized for storage of NGL product.

The threshold set out in the *Regulations Designating Physical Activities* for a storage facility of liquefied petroleum gas is 100,000 m^3 (Section 14(f)). At least three of the underground storage caverns are expected to contain liquefied petroleum gas, thereby exceeding the threshold for a storage facility.

Refer to Section 2.1 for a description of the processes and infrastructure associated with the Project.

Permanent structures will consist of office, maintenance, electrical and control buildings, two pump buildings, surface piping, treating facilities, pipelines for underground water, brine and on-site product, and four underground storage caverns.

During construction, temporary structures will be required for construction offices, equipment storage, workforce muster points and various other functions. The temporary structures will be similar to those typically used on large construction sites (e.g. integrated workforce trailer systems). All temporary structures will be removed from the site once construction is complete.

2.3.3 Percentage Increase in Capacity

This Project is not an expansion of an existing facility; therefore, this section is not applicable.

2.3.4 Description of Project Activities

The activities to be performed in relation to the designated project include:

- Construction of the components of the Project;
- Operation for the life of the Project (anticipated to be at least 25 years); and
- Decommissioning of the Project facilities following completion of operations.

2.3.4.1 Construction

2.3.4.1.1 Salt Caverns and Injection Wells (Salt Cavern Development)

Caverns will be developed by injecting fresh water into the previously drilled wells to dissolve the salt, and create a brine solution which is pushed out of the cavern by the injected fresh water. The brine will be disposed through existing disposal wells into a deep secure formation. This process occurs continuously for 40 to 50 weeks until the desired cavern size is achieved.

2.3.4.1.2 Brine Pond

Topsoil and subsoil will be stripped from across the proposed pond area and stockpiled. The area will be excavated and berms will be constructed to create the desired brine pond volume. Dewatering will be required during the excavation of the pond. Two layers of high density polyethylene (HDPE) liner will be installed over the excavated pond, between which a leak detection system will be installed. The leak detection system will be comprised of a network of weeping tile piping connected to sumps. A secondary system will also be used to control groundwater beneath the bottom liner.

2.3.4.1.3 Brine Pump House

The brine pump house will be constructed in conjunction with the brine pond. Once the location has been excavated to the required depth, the foundation of the pump house will be constructed, followed by installation of mechanical and electrical components and the pump house building.

2.3.4.1.4 NGL Product Handling Facility

Construction of the product handling facility will begin with site preparation and grading, including infilling of the wetland on the northwest corner of the Project site. Refer to 5.1.4 for detailed wetland information. An application under the *Water Act* has been submitted for approval to infill and compensate for the wetland. Excess fill from the brine pond construction will be used to fill in the wetland. Once the site has been prepared, buried utilities will be installed, followed by above ground piping and facilities, building foundations, pumping and treating equipment, and office, maintenance, electrical and control buildings.

2.3.4.1.5 Cavern Washing Pipelines

Construction of the fresh water and brine pipelines will commence with stripping the topsoil from the route, followed by excavating the required trench, installing the piping, and backfilling. Once construction is complete, this disturbed area will be restored.

2.3.4.2 Operations

The main facilities associated with operating the Project are pumps, separators and dehydrators that will transfer the NGL products into or out of the storage caverns to meet customer requirements. Maintenance activities on these associated facilities will be ongoing throughout operation.

2.3.4.3 Decommissioning

The decommissioning of the salt caverns and associated facilities and infrastructure will include removing all major buildings and equipment and returning the project site to an equivalent pre-development land capability. The storage caverns will be filled with brine and the wells will be abandoned as per AER requirements.

2.4 EMISSIONS, DISCHARGES AND WASTES

2.4.1 Atmospheric Contaminant Emissions

Refer to section 5.1.8 for additional details on atmospheric contaminant emissions.

2.4.1.1 Air

There will be no continuous air emissions associated with the Project. Intermittent air emissions as a result of the Project will consist of products of combustion and will be minor and limited to the following two sources:

- Small volumes of hydrocarbons, de-gassed from the brine prior to storage in the brine pond. Recovery of hydrocarbons from the brine will be required infrequently and only in upset conditions. Hydrocarbon volumes will be small and will be flared on site. Flaring of de-gassed hydrocarbons will follow AER Directive 60: Upstream Petroleum Industry Flaring, Incinerating and Venting; and
- Emissions from dehydration activities will be captured and incinerated on site and managed in accordance with guidance from the AER and the Canadian Association of Petroleum Producers (CAPP).

2.4.1.2 Noise

The Project work will contribute to noise levels in the area during the construction and operation phases. AESL conducted a noise impact assessment for the Project in accordance with AER Directive 38 – Noise Control and is in the process of assessing the results. Where practical, AESL will locate noise emitting equipment within buildings to aid in noise abatement.

All noise emissions from the Project will comply with AER Directive 38 – Noise Control. Compliance with D-38 will be demonstrated through conformance with the Regional Noise Model developed though the Northeast Capital Industrial Association (NCIA), in collaboration with the AER. (Refer to section 3.1 for details on the NCIA Regional Noise Management Plan). The Project will comply with noise level requirements of the NCIA Regional Noise Management Plan, Strathcona County noise bylaws, and any potential conditions within the Development Permit issued by the County for the Project.

2.4.2 Sources and Location of Liquid Discharges

Water for the Project will be sourced from the NSR through existing infrastructure and under existing water diversion licenses.

Liquid discharges from the Project will consist of solution mining waste water, small amounts of process wastewater, and domestic sewage.

Solution mining waste water will be generated during the development of the caverns. This waste water will include high concentrations of dissolved sodium chloride from the salt formation as well as hydrocarbon residue from the control fluid (diesel) used during washing. All waste water will be disposed through two existing licensed disposal wells owned and operated by AESL.

Small amounts of process wastewater will be generated by the NGL process dehydrators. All process wastewater will be stored temporarily and disposed of at a licensed disposal facility.

Domestic sewage from an office located on site will be collected in a septic holding tank. The contents of the tank will be pumped out and disposed at a licensed disposal facility.

In addition, a storm water management plan will be developed for the Project area to allow for surface water and high level ground water beneath the brine pond, to be collected and managed in accordance with the EPEA approval conditions. Storm water will be directed to an onsite wetland for management.

2.4.3 Types of Wastes and Plans for Their Disposal

Solid wastes will be generated during construction and decommissioning. Low quantities of solid waste will be generated through the ongoing operation of the storage caverns. All wastes are identified in Table 2-2 and will be disposed of according to the applicable provisions of the Waste Control Regulation and the requirements for each waste classification outlined in the Alberta Waste Users Guide for Waste Managers (AEP 1999). Solid wastes will be either recycled or disposed of through licensed waste disposal companies at licensed facilities. A waste management plan will be developed for the Project as part of its construction and operating procedures.

Table 2-2 Wastes and Waste Management Methods for the Project

Waste Stream	Management Method
Domestic and Shop waste	Contracted waste disposal
Recyclables (wood, paper, metal)	Contracted recycling
Hazardous waste	Licensed disposal facility
Waste oil	Licensed recycler

2.5 CONSTRUCTION, OPERATION, AND DECOMMISSIONING AND ABANDONMENT PHASES AND SCHEDULING

A high-level Project schedule is provided in Table 2-3. Additional details are provided in Section 2.3.4.1 (construction) and Section 6.0 (public consultation).

Table 2-3 Project Schedule

Key Project Phase	Proposed Project Schedule
Prepare site (grading and leveling)	Q3 to Q4 of 2014
Convert test wells to injection wells	Q4 2014 to Q4 2015
Construct cavern washing pipelines and surface facilities	Q3 2014 to Q1 2016
Construct brine pond and pump house	Q3 2014 to Q4 2015
Begin commercial operation	Q1 2016
Decommission and abandon	2040 or later

Third Party infrastructure, as described in section C of Table 2-1, including the connecting pipelines and electric and gas service, will be constructed and under the ownership, care, and control of the third parties identified in 2.1.2.

3.0 Project Location

The Project site is within the AIH region, 14 km northeast of Fort Saskatchewan and approximately 30 km northeast of Edmonton (see Figure 3-1). It is part of the Strathcona Heavy Industrial Policy Area as defined by the AIH Area Structure Plan Bylaw (Strathcona County 2007) and zoned as "Heavy Industrial" by Strathcona County. The NSR is the closest major water body, approximately 5 km west of the Project site.

The Project site is located at SW 34-55-21 W4M. All new surface operating facilities and all wellheads for the Project will be located at this site. Two of the underground salt caverns will be developed in SW 34-55-21 W4M and two caverns will be developed in NW 34-55-21 W4M.

AESL holds the land title (fee simple) for SW 34-55-21 W4M. Refer to Appendix B for a copy of the legal title for the land parcel.

AESL holds Special Mineral Lease agreements for the south half of NW 34-55-21 W4M and all of SW 34-55-21 W4M to develop caverns and conduct storage operations in the Lotsberg formation under these lands. AESL holds the surface rights for SW 34-55-21 W4M and the surface rights for NW 34-55-21 W4M are privately held.

AESL's existing cavern washing facilities are located on a surface lease held by AESL in SE 34-55-21 W4M and will be used during the construction phase of the Project.

The coordinates of the centroid of the project area are as follows:

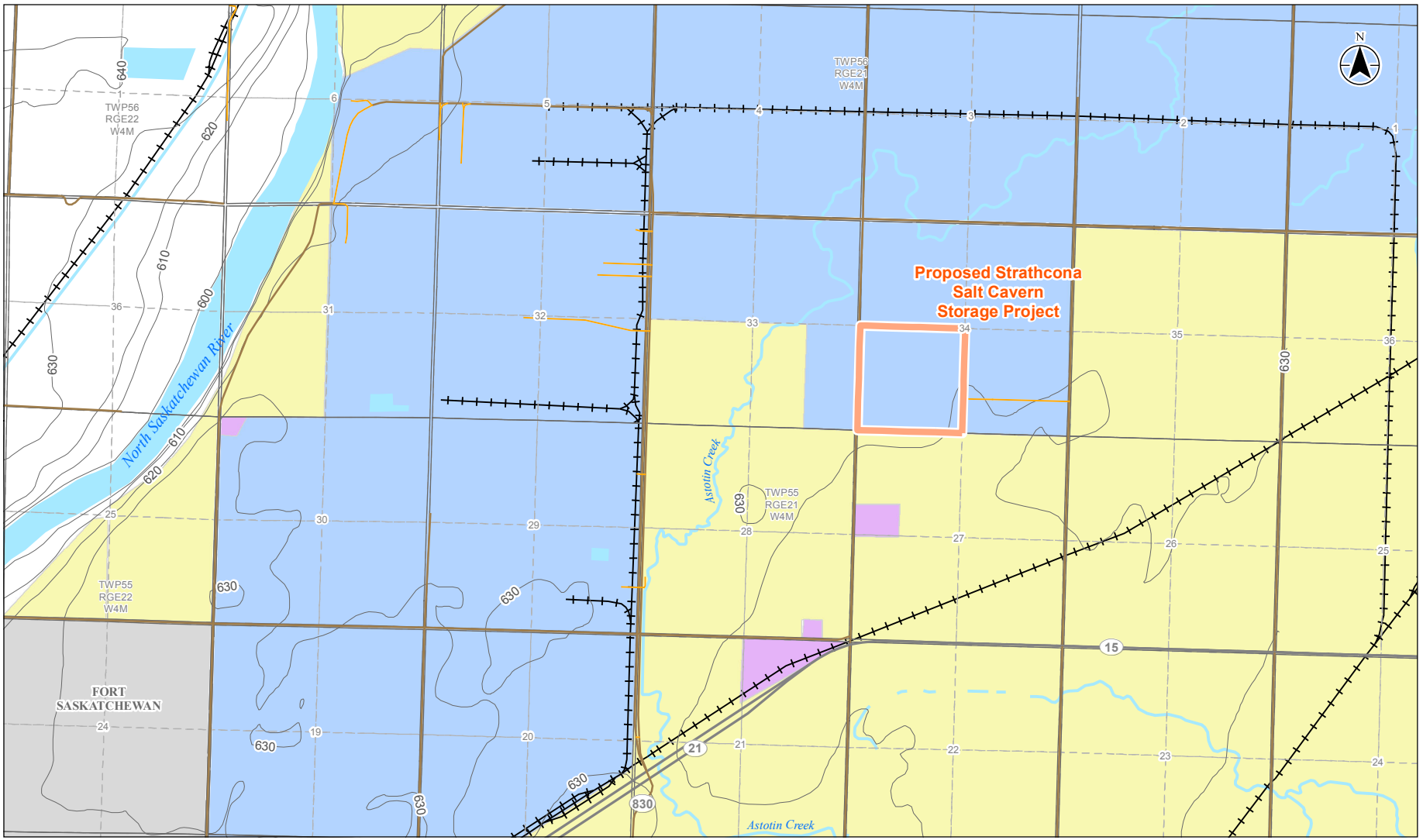
- Easting: 365378.506
- Northing: 5962380.709959
- Latitude: 53° 47' 33.244"
- Longitude: -113° 2' 37.396"

A site plan of the Project is provided in Figure 2-3. Photographs of the Project site are provided in Photos 3-1 through 3-3.

There are currently six permanent residences occupied within 1.5 km of the Project site (Figure 3-2).

The nearest First Nation Reserve is the Alexander First Nation (Treaty Six) on Indian Reserves 134, 134A and 134 B (located west of Morinville, AB) located 51 km west of the Project. Refer to Tables 6-1 and 6-2 and Figure 3-3 for additional information on First Nations and Metis Settlements within 100 km of the Project. The Project site has been privately owned since the early 1900s, and is not used for traditional purposes by Aboriginal peoples.

The closest federal land is Elk Island National Park, approximately 13 km southeast of the Project and shown on the Regional Area Map, Figure 3-4.



Contour (10m)

Designated Land Use

- Agriculture: General
- Heavy Industrial
- Medium Industrial
- Project Area

- Primary Highway
- Secondary Highway
- Local Road
- Railway
- Watercourse
- Waterbody

0 0.5 1 Kilometres

1:45,000 (At original document size of 8.5x11)

Reference

ATCO Energy Solutions, AltaLIS, CanVec, GeoLogic, Parks Division - Alberta Tourism, Parks and Recreation

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ATCO Energy Solutions

Coordinate System
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123511289-0008
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Technical Review by CS on 7/22/2014

Client/Project
Strathcona Salt Cavern Storage Project

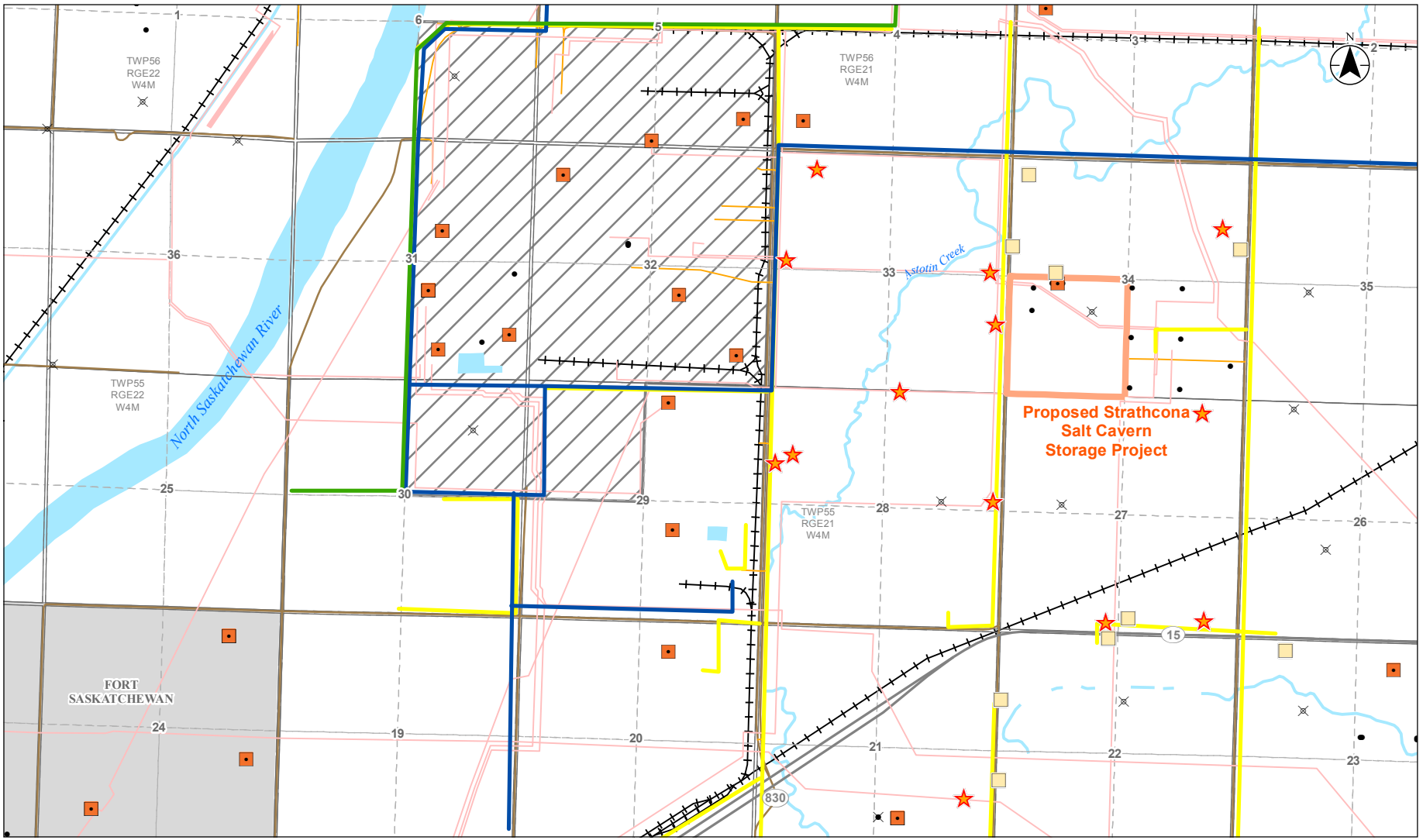
Figure No.
3-1

Title
Project Site

Photo 3-1 Looking northwest across the Project site towards Wetland W3

Photo 3-2 Looking east across Wetland W3 towards the Project site

Photo 3-3 Looking east towards the Project site



- Abandoned Oil/Gas Well
- Active Oil/Gas Well
- Existing Archaeological Site
- Residence
- Oil/Gas Facility

Transmission and Distribution Line Types

- 240 kV
- 138 kV
- 13.8 kV or 25 kV
- Industrial Site
- Project Area
- Pipeline
- Primary Highway
- Secondary Highway
- Local Road
- Railway
- Watercourse
- Waterbody

0 0.5 1 Kilometres

1:40,000 (At original document size of 8.5x11)

Reference

ATCO Energy Solutions, AltaLIS, CanVec, GeoLogic, Parks Division - Alberta Tourism, Parks and Recreation, ATCO Power Heartland Generating Station Application

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123511289-0006
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Technical Review by CS on 7/22/2014

Client/Project
Strathcona Salt Cavern Storage Project

Figure No.
3-2

Title
Energy Infrastructure, Occupied Residences and Archaeological Sites

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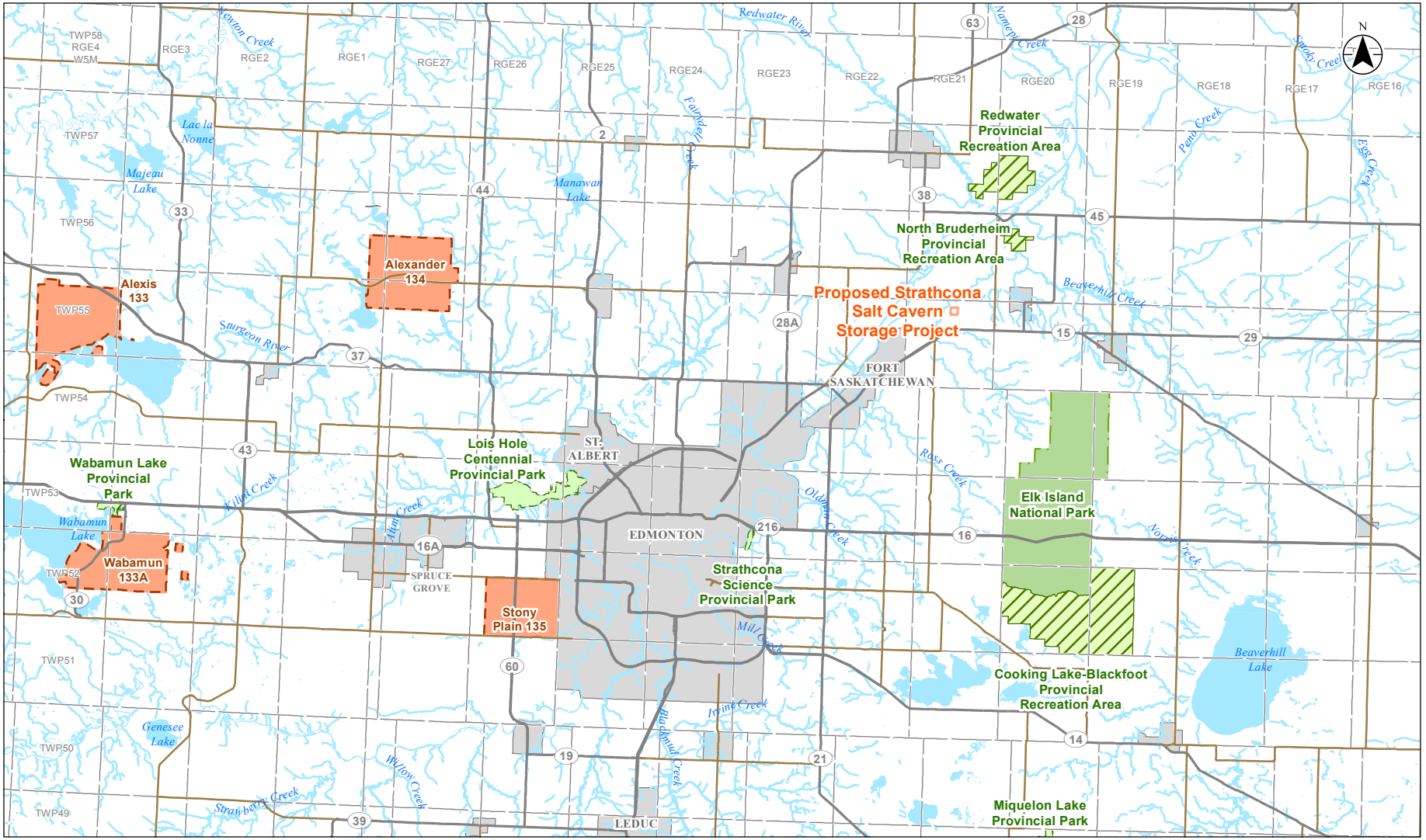

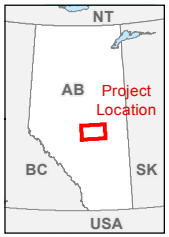

- Project Area
- Primary Highway
- Secondary Highway
- Watercourse
- First Nations Reserve
- National Park
- Provincial Park
- Provincial Recreation Area/ Natural Area
- Urban Area
- Waterbody

0 10 20 Kilometres

1:650,000 (At original document size of 8.5x11)

Reference
ATCO Energy Solutions, AltaLIS, GeoLogic, Parks Division - Alberta Tourism, Parks and Recreation

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Coordinate System
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123511289-0002
Prepared by CES & AS on 7/22/2014
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Client/Project
Strathcona Salt Cavern Storage Project

Figure No.
3-3

Title
First Nations and Local Communities

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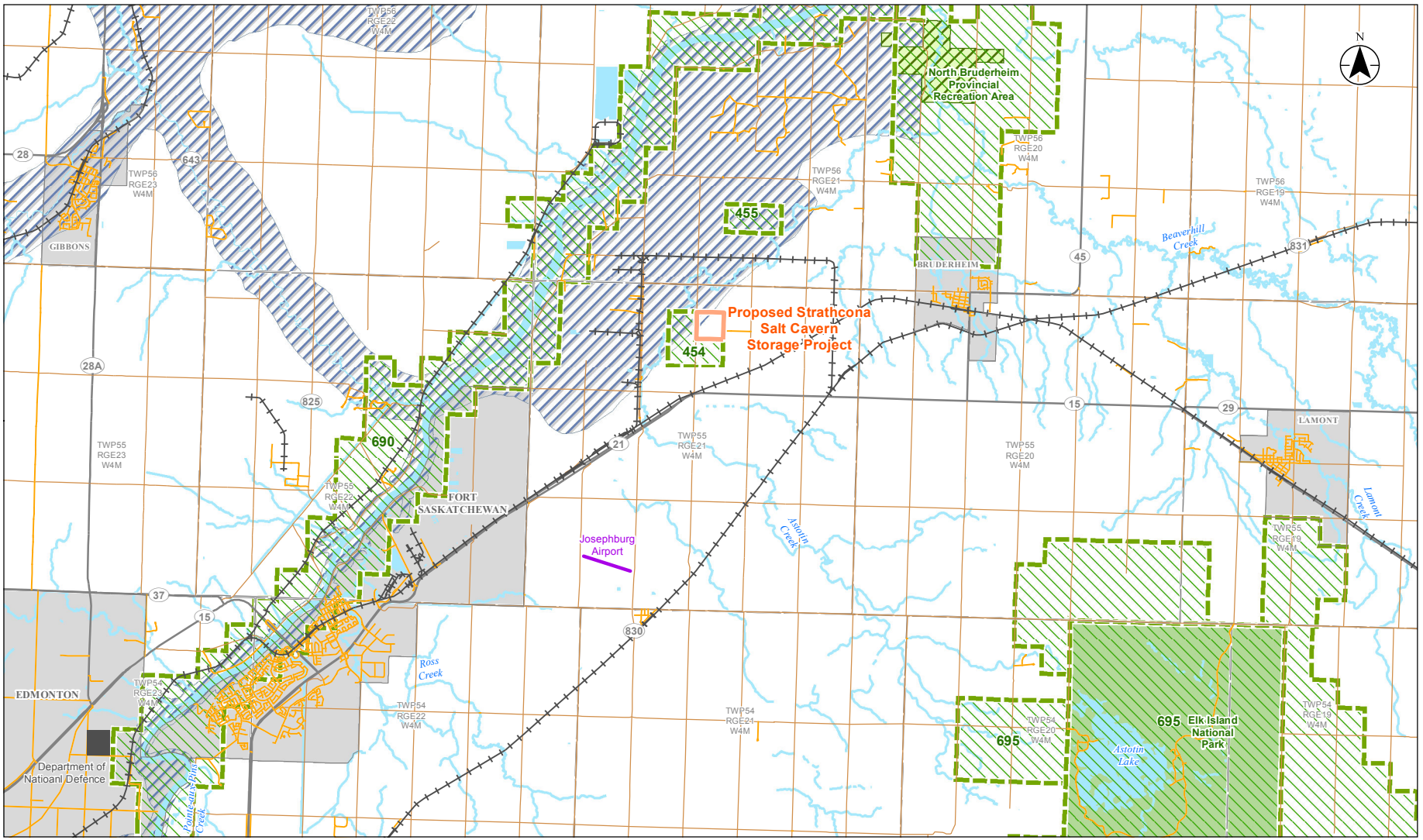

Reference
ATCO Energy Solutions, AltaLIS, CanVec, GeoLogic, Parks Division - Alberta Tourism, Parks and Recreation

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ATCO Energy Solutions

Coordinate System
NAD 1983 UTM Zone 12N

123511289-0005
Prepared by CES & AS on 7/23/2014
Technical Review by CS on 7/23/2014

Client/Project
Strathcona Salt Cavern Storage Project

Figure No.
3-4

Title
Environmentally Sensitive Areas, Federal Lands and Airports

3.1 LAND AND WATER USE

AIH is a joint land use planning and development initiative between five municipalities in the Edmonton Capital Region to attract investment to the region from the chemical, petrochemical, and oil and gas industries (Figure 1-1). It is a heavily industrialized area of the province which has been specifically designated for industrial use. Land use in the AIH has a strong industrial base of oil and gas processing, chemical manufacturing, hydrocarbon storage and loading facilities including salt cavern storage and power generation facilities. Future industrial growth in the region is expected to include bitumen upgrading, NGL processing, additional chemical manufacturing facilities, and hydrocarbon storage and logistics terminals.

The AIH is a region that has been heavily affected by human development. The Project site is currently cultivated land and the area surrounding the Project site consists of a mix of industrial facilities, rural farms and residences, as well as public infrastructure including Highway 15 and various railway lines. The Project site is located near multiple industrial facilities, including Shell Canada's Scotford Manufacturing Centre (Figure 1-2).

The Northeast Capital Industrial Association (NCIA), which consists of industrial companies in the AIH and Fort Saskatchewan area, allows member companies to work together to monitor noise and groundwater quality. The NCIA has developed a Regional Noise Management Plan (RNMP) for the AIH. The purpose of the RNMP is to provide facilities in the AIH with an alternative method for demonstrating compliance to noise management requirements (e.g. an alternative to Permissible Sound Level [PSL] compliance conventionally required by Alberta Utilities Commission (AUC) Rule 012 and by AER Directive 038). The NCIA RNMP has recently been approved by both the AUC and the AER as an acceptable alternative to conventional PSL compliance.

The NCIA is currently developing a Regional Groundwater Monitoring Framework in conjunction with ESRD, which will be part of the North Saskatchewan Regional Planning process. In addition, NCIA has been working with the provincial government to finalize a Groundwater Monitoring Directive for the AIH. The NCIA is currently proceeding with an annual groundwater quality monitoring program.

As noted in section 1.4.2, the NSRP is currently in the early development phase by ESRD under Alberta's Land-use Framework. AESL does not anticipate any concerns with meeting the forthcoming NSRP requirements.

The Project will not involve the construction, decommissioning or abandonment of a marine terminal.

The Project will not take place within waters or lands administered by a Canada Port Authority under the *Canada Marine Act* and its regulations.

The Project will not require access to, use of, or the exploration, development, and production of resources or lands currently used for traditional purposes by Aboriginal peoples. It will be constructed on lands that have been privately owned since the early 1900s.

4.0 Federal Involvement

4.1 FEDERAL FINANCIAL SUPPORT

The Project does not include any proposed or anticipated federal financial support.

4.2 FEDERAL LANDS

There will be no federal lands used for the purpose of carrying out the Project, nor will there be any granting of interest in federal land (i.e. easement, right-of-way, transfer of ownership).

4.3 FEDERAL LEGISLATIVE OR REGULATORY REQUIREMENTS

Outside of the Physical Activities Regulations under the Canadian Environmental Assessment Act, there are no federal legislative or regulatory requirements (including any federal permits, licenses or other authorizations) applicable to the Project.

Federal Involvement
July 2014

5.0 Environmental Effects

Section 5.1 summarizes available information on the existing physical, biological and human environment of the Project site and surrounding area. The section also describes the potential interactions between the Project and the environment, and assesses changes that might occur as a result of Project activities or infrastructure.

Section 5.2 provides a more detailed description of the potential for environmental effects on fish and fish habitat as defined under the *Fisheries Act*, aquatic species as defined under the *Species at Risk Act (SARA)*, and migratory birds as defined in the *Migratory Birds Convention Act*.

5.1 PHYSICAL AND BIOLOGICAL COMPONENTS THAT MIGHT BE ADVERSELY AFFECTED BY THE PROJECT

5.1.1 Environmental Overview Methods

A desktop review, site visits and discipline specific field surveys and studies have been (or are scheduled to be) conducted to identify potential environmental considerations relevant to the Project. These include:

- A field level soil and terrain assessment, to be conducted in July 2014, to develop a Project-specific conservation and reclamation (C&R) plan. Refer to section 5.1.3.
- A wetland assessment for the Project area, in 2013, to identify the presence of wetlands on the site, incorporate this information into the design of the Project, and where necessary, develop mitigation strategies for the wetlands. In October 2013, AESL received confirmation from ESRD that one of three wetlands on the Project site was being claimed by the Crown for the purposes of the Project. AESL has submitted an application under the *Water Act* requesting approval to remove one of the non-crown claimed wetlands which falls within the Project development area.
- AESL has submitted a *Water Act* application for a wetland to be removed by the proposed Project. Refer to section 5.1.4.
- A desktop review and wildlife observations to determine the state of local wildlife and wildlife habitat, and to identify sensitive species and habitats that may occur within the vicinity of the Project. Wildlife observations were collected during the wetland assessment. Refer to section 5.1.5.
- A baseline hydrogeological assessment for the purpose of characterizing groundwater in the proposed area of the pond and to support the design of the brine pond. The information from the groundwater investigation was also used to develop mitigation measures and monitoring programs for the brine pond and for stormwater management across the Project area. Refer to 5.1.6.
- A noise impact assessment was conducted for the Project in June 2014. Refer to 5.1.9.
- AESL will apply for a Historical Resources Assessment clearance from Alberta Culture. Refer to 5.1.10.

AESL also reviewed available information in the form of reports, maps and publicly available databases. Applicable information is provided throughout Section 5. Potential adverse environmental effects of the Project were evaluated through consideration of the interaction between the Project and the environment. Mitigation measures that could limit any potential adverse environmental effects were also included in the overview.

5.1.2 Current State of the Environment

The Project site, including the footprint for the underground storage caverns, brine pond and associated surface infrastructure is located within the AIH.

Land use in this area includes a mix of agricultural (both cropland and pasture), light to heavy industry, and low density residential housing. Lands within and adjacent to the Project are predominantly cropland with some industrial development, including oil and gas infrastructure. The Shell Scotford Complex, which is comprised of a refinery, upgrader, and chemicals manufacturing plant, is situated immediately west of the Project site. ATCO Pipelines' Salt Cavern natural gas storage facility is located immediately east of the Project site. Refer to Figure 1-1 for an overview of the area.

The Project is located in the Dry Mixedwood Natural Subregion of the Boreal Forest Natural Region and the Central Parkland Natural Subregion of the Parkland Natural Region of Alberta (Alberta Tourism Parks and Recreation 2012).

The Dry Mixedwood Natural Subregion is characterized by level to gently undulating glacial till or lacustrine plains. It has the warmest summers of the Boreal Region and the most days favourable to plant growth (Natural Regions Committee 2006). Aspen stands (*Populus tremuloides*) and cultivated landscapes, with fens in the low-lying areas dominate this landscape. Jack pine (*Pinus banksiana*) stands with lichen in the understory occupy dry, rapidly drained eolian or glaciofluvial deposits. In areas where water is in slightly greater quantity, the dominant stand types consist of mixed jack pine, aspen and white spruce (*Picea glauca*) in pure or mixed formation (Natural Regions Committee 2006).

The Central Parkland Natural Subregion is the most densely-populated region in the province, and most of its native vegetation has been altered by human development. Groves of aspen and balsam poplar (*Populus balsamifera*) are intermixed with grasslands and depressional wetlands (Natural Regions Committee 2006). Temperature, precipitation and growing seasons are characterized as intermediate between the dry, warm grasslands to the south and the cooler, moist boreal forests to the west and north.

Elevations vary from 500 m (near the Alberta-Saskatchewan border) to 1,250 m (near Calgary). Landform features include undulating till plains and hummocky uplands. Approximately 80% of the plains and 65% of the hummocky uplands are cultivated, the remainder is grazing land. Wetlands are common, occupying approximately 10% of the subregion. Marshes, willow shrub

lands and seasonal ponds are the most common types of wetlands encountered (Natural Regions Committee 2006).

The Project area is located within the North Saskatchewan River watershed in an area of relatively flat topography with localized depressional features. The topography of the area is presented in Figure 3-1. Local topographic relief is relatively low, and generally slopes northwest towards the North Saskatchewan River located approximately 4,500 m west-northwest of the site. At the edge of the river valley, the topography slopes steeply toward the river (approximately 30% slope).

At the time of the wetland assessment site visit in July 2013, the Project area was composed mainly of agricultural land with several disturbed depressional areas and one farmyard located in the west central portion of the quarter section. The remainder of the Project area was seeded to canola. Given the extensive existing disturbance across and in the vicinity of the Project area, and the agricultural ground cover, these lands are considered to have low potential habitat value for wildlife, and limited potential to support rare plant species.

5.1.3 Soils and Terrain

The topography in the general area of the Project is gently undulating. The ground elevation of the Project area ranges from approximately 630 m above sea level (ASL) in the southeast corner to approximately 620 m ASL in the depressional area in the central area of the quarter section. The Quaternary deposits in the region consist of preglacial, lacustrine, aeolian, and fluvial deposits. The preglacial Beverly Channel, which has been infilled with sand and gravel deposits (Empress Formation), is the most widely used aquifer in this area.

Locally, the Project area is underlain by glacial till and surficial sand, primarily in the northwest corner of the lands. Glacial till deposits are present beneath the site to a thickness of up to 24 m. Glaciolacustrine deposits are present above the till in the western portion of the site, consisting of higher plasticity silt clays that are more homogenous than the till. The surficial sediments beneath the site consist of aeolian and/or glaciolacustrine sand. The majority of the sand encountered near the ground surface is well sorted fine grained sand indicative of aeolian deposition.

The Project area is in soil correlation areas (SCAs) 10 and 12. Much of the Project site in SCA 10 is predominantly Black Chernozemic soils, but also includes areas of less productive Dark Gray Chernozemic soils and Brunisolic soils. There are also pockets of Solonetzic soils, across this area, which are often high in salts. Soil conditions for growing crops vary from lands that have few or only moderate limitations to areas unsuitable for crop growth (e.g. wetlands).

AESL will conduct a field level soil and terrain assessment across the Project area prior to development and in support of regulatory applications. The information from the field survey will be used to develop a Project-specific conservation and reclamation (C&R) plan that will follow relevant best practice for soil conservation in agricultural areas. The C&R plan will be prepared in accordance with AER's Guide to Content for Industrial Approvals (2014), as part of AESL's

application to the AER for approval under the EPEA. In addition, AESL will comply with applicable soil stripping and setback restrictions surrounding the identified wetlands on site.

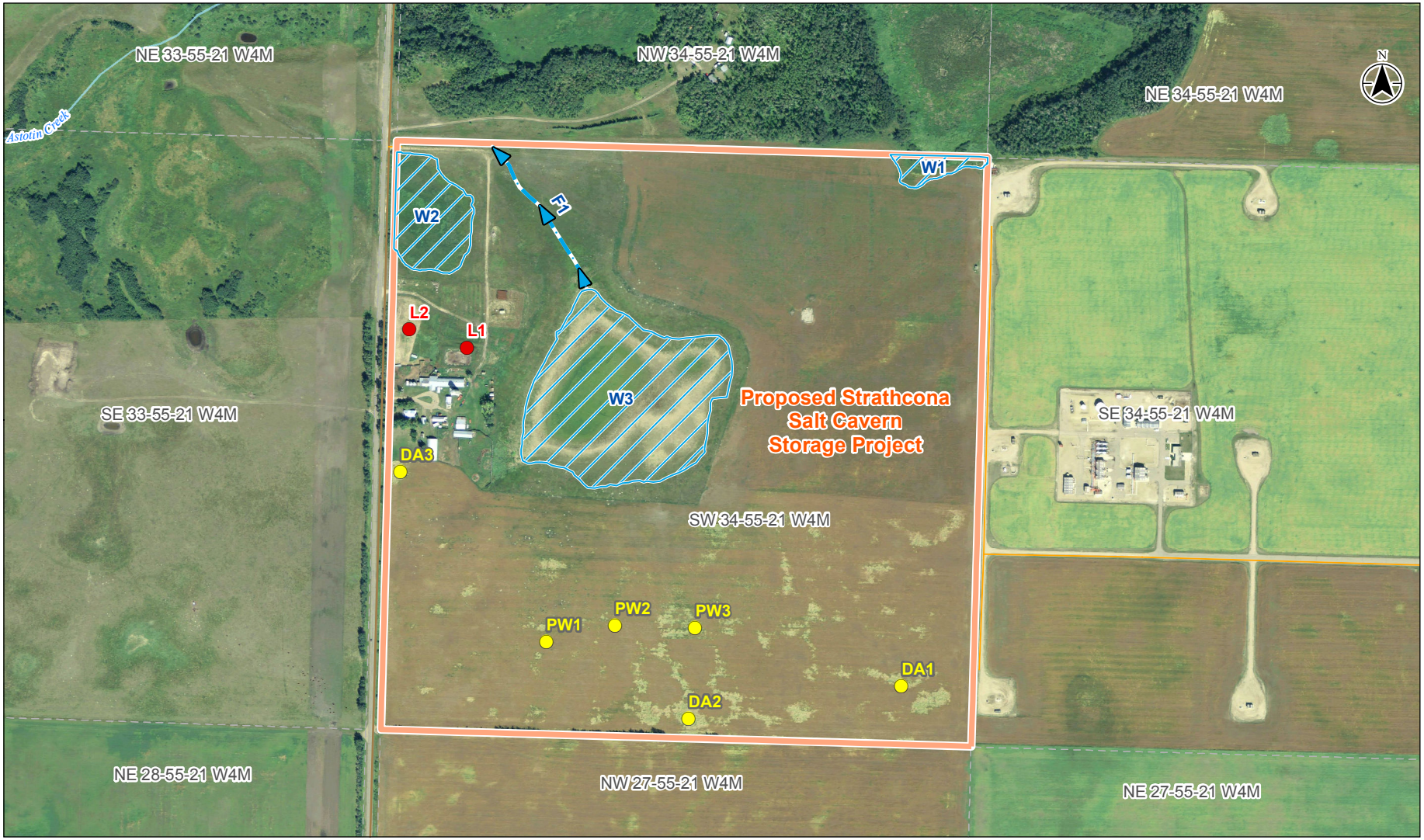
5.1.4 Vegetation and Wetlands

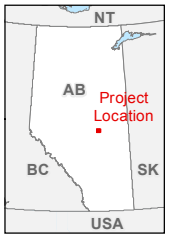
AESL conducted a wetland assessment for the Project in July of 2013. The site was composed mainly of agricultural land with several disturbed depressional areas, three wetlands, one field drainage, two livestock sewage lagoons and one farmyard located in the central portion of the western border (see Figure 5-1). At the time of the assessment the site was uniformly seeded to canola. Adjacent properties surrounding the Project are primarily agricultural and industrial. An ATCO Pipelines facility is located to the east.

Three wetlands were observed during the assessment, as indicated on Figure 5-1. All three wetlands (W1, W2 and W3) were classified as Class IV Ponds (semi-permanent ponds and lakes) as per Alberta's Wetland Policy and wetland classification system for the white zone of the province (Steward and Kantrud 1971). In total, these wetlands encompass an area of almost 7 ha. Vegetation within and adjacent to these wetlands included native species such as cattail, duckweed and common great bulrush, common pike rush, slough grass, foxtail barley and willow. A number of non-native vegetation species were also identified within the wetlands. No ACIMS listed or SARA listed vegetation species were observed during the wetland assessment.

During the site visit, a field drainage (F1) was also observed running from the northwest corner of the Project area connecting wetland (W3) to a large wetland complex north of the northwest corner. Refer to Figure 5-1. This field drainage appears to have been enhanced by berms. Two lagoons were observed north of the farmyard and adjacent to a barn.

In October 2013, AESL received confirmation from ESRD that one of three wetlands on the





- Depressional Area
- Sewage Lagoon
- Project Area
- Wetland
- Ephemeral Drainage
- Secondary Highway
- Local Road
- Watercourse

0 100 200 Metres

1:8,000 (At original document size of 8.5x11)

Reference
ATCO Energy Solutions, AltaLIS, CanVec, GeoLogic, Parks Division - Alberta Tourism, Parks and Recreation

Stantec

ATCO Energy Solutions

Coordinate System
NAD 1983 UTM Zone 12N

123511289-0009
Prepared by CES & AS on 7/22/2014
Technical Review by CS on 7/22/2014

Client/Project
Strathcona Salt Cavern Storage Project

Figure No.
5-1

Title
Wetland Delineation

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Project site was being claimed by the Crown for the purposes of the Project. AESL has submitted an application under the Alberta *Water Act* requesting approval to remove one of the non-crown claimed wetlands (W2) as it falls within the footprint of the development. The crown-claimed wetland (W3) is proposed to be used as a basin for onsite storm water collection. The third wetland (W1) will not be disturbed as part of the Project. AESL will mitigate identified potential adverse environmental effects associated with the wetlands by implementing the following mitigation measures:

- Wetland (W2) will be drained. The topsoil will be salvaged and the wetland will be filled with an appropriate material.
- A wetland compensation program will be implemented to mitigate the loss of the wetland (W2). AESL will work with ESRD and Strathcona County to develop an appropriate wetland compensation program to offset the loss of wetland function.
- Where possible, activities will take place outside Environment Canada's Restricted Activity Period for migratory birds, which is currently April 15 to August 20 in wetlands. Where any activities are required during this period, a breeding bird survey will be conducted before commencing any activities in the affected wetlands, and based on the findings, any required action or protocols will be taken.

AESL will also incorporate wetland mitigation measures into its C&R plan. The C&R plan will be prepared as a requirement of AESL's application for approval under the EPEA.

Following the wetland compensation program, the Project will not result in adverse effects on wetlands in the region.

5.1.5 Wildlife

A desktop review was done to determine the state of local wildlife and wildlife habitats, and to identify sensitive species and habitats that may occur within the vicinity of the Project.

The Project area offers limited high quality wildlife habitat given its level of agricultural and industrial development. Cultivated land typically provides low suitability habitat for wildlife, however, the following species can potentially be found:

- Canada goose (*Branta Canadensis*)may use cultivated fields during migration
- Diurnal and nocturnal raptors such as Swainson's hawk (*Buteo swainsoni*) or great gray owl (*Strix nebulosa*), both listed as sensitive by ESRD, may use the Project area to forage for small rodents
- Ungulates may use the Project area for feeding and traveling
- Small mammals may use the Project area for traveling and foraging

Wildlife observations were also collected during the wetland assessment in July 2013. At this time the following species tracks were observed in the mud within the wet meadow zone: Moose (*Alces alces*) tracks; coyote (*Canis latrans*) tracks; and deer (*Odeocoileus virginianus*) tracks.

Boreal chorus frogs *(Pseudacris* maculata) were also observed within the wet meadow zone. Birds observed included a variety of ducks and red-winged blackbirds (*Agelaius phoeniceus*).

Approximately 10 hectares in the northwest corner of the Project site sits within a Key Wildlife Biodiversity Zone (KWBZ) and the Project site sits within Environmentally Significant Area (ESA) 454.

- KWBZs are areas identified by ESRD as having high biodiversity potential and/or being key ungulate winter habitat. Timing restrictions apply to all projects in the KWBZs.
- ESAs are locations that are essential for the conservation of biodiversity in Alberta. The site is within ESA 454, a provincially important ESA located within the Boreal Natural Region and established for the protection of provincially listed vascular plants and mosses.

Although a portion of the Project site is within a KWBZ and ESA 454, the lands have been significantly disturbed by long-term agricultural activity and there is no high suitability habitat present for ungulates or native vegetation. The Project site is identified as having low wildlife habitat suitability on the basis that that the surrounding area is heavily industrialized, with a major industrial complex located nearby. The Project site has been under cultivation for over 40 years, with virtually all native habitats having been eliminated. In addition, based on the results of the wetland assessment it was concluded that the wetlands have marginal habitat suitability for wildlife due to disturbance from long-term agricultural activity.

The ground disturbance in the Project area will remove approximately 13 ha of low suitability wildlife habitat (i.e., cultivated land and disturbed wetland). In the event that site clearing is scheduled to occur within the breeding bird window, nest sweeps will be conducted by a qualified biologist to identify active nests protected under the *Migratory Birds Convention Act* and the *Migratory Birds Regulation*. Additionally, AESL will endeavor to undertake clearing and grading activities outside the KWBZ restricted period (January 15 to April 30). If Project activities are required within this restricted period, a wildlife management plan will be developed and wildlife surveys (e.g., a winter mammal tracking survey) will be performed prior to their undertaking (ESRD 2010).

As described in 5.1.4, wetland (W2) will be removed and wetland (W3) will be used as a basin to which stormwater and highlevel groundwater beneath the brine pond will be directed. Both of these wetlands have been previously affected by agricultural practices. Based on the results of the wetland assessment, it was concluded that the wetlands have marginal habitat suitability for wildlife due to disturbance from long-term agricultural activity (Cohen, et al, 2013).

The primary mitigation to limit potential adverse environmental effects on wildlife and to ensure compliance with the *Migratory Birds Convention Act* will be to conduct vegetation clearing outside the migratory bird restricted activity periods (May 1 to August 20 in upland areas and April 20 to August 25 in wetlands).

AESL has consulted with ESRD and Canadian Wildlife Service on the potential for brine ponds to affect wildlife (P. Gregoire, CWS). Potential concerns to birds are effects to feathers from brine,

either to their insulation properties or to the ability of landed birds to take flight, and potential toxicity from the salt by ingestion. There are no concerns for petroleum hydrocarbons or oil-based products from the storage caverns reaching the brine pond because as brine is displaced into the pond from the caverns, it will flow through a de-gassifier to remove all NGL (i.e. hydrocarbon) products.

The brine stored in the pond will have a sodium chloride salt concentration of approximately 27 % under fully saturated conditions. It is anticipated that the surface layer of the pond could be less saline due to inputs from precipitation. The brine composition will be primarily sodium chloride with a minimal amount of potassium chloride. The expected specific gravity at saturation will be approximately 1.2 with a salt concentration of approximately 26%. The sodium chloride concentration will be about 260 gm/L with potassium chloride concentrations ranging from zero to 3 gm/L.

The pond will be designed with measures that will minimize impacts to wildlife and deter birds from using the pond for roosting, nesting, foraging or resting. It will be fenced around the perimeter to limit access to terrestrial animals. The brine pond will be lined with double high density polyethylene (HDPE) liners that will extend from the interior of the pond, to approximately 1 m across the top of the pond berm where they will be anchored in a trench. The remainder of the pond berm top, which is 5 m in total width, will have gravel surfacing suitable for pedestrian and light vehicle access. The lack of a vegetated margin on the edge of the pond and on top of the pond berm will deter nesting and feeding activity by waterfowl.

It is anticipated that birds will be preferentially attracted to the more suitable habitat provided by either the 5.22 ha natural wetland (W3) that will be retained on the project site, or to the extensive wetlands (including W1) associated with Astotin Creek, 15 ha of which are located approximately 400 metres to the north of the brine pond.

Four operators of cavern storage facilities, some with multiple brine ponds of similar size to the proposed brine pond, exist in the area and no adverse effects on birds have been observed by these operators. These operators have no specific bird deterrent systems in place.

Because of the proximity of preferential habitat, the lack of vegetated margin, and the positive experience of other brine pond operators in the area, the brine pond is not expected to adversely affect wildlife, including birds. AESL will conduct increased monitoring of the brine pond for the first two years of its operation to confirm that migratory birds and other wildlife are not impacted. Should any indication of an adverse effect on wildlife arise, AESL will consider the installation of further deterrents, such as effigies, at the perimeter of the pond.

Given the small surface area of the project, the level of industrial development in the area and the mitigation measures described above, the Project is not expected to result in adverse environmental effects on wildlife and wildlife habitat.

5.1.6 Groundwater

AESL completed a baseline hydrogeological assessment of the Project area focused on the footprint for the proposed brine pond. The assessment included drilling five shallow boreholes and installation of associated monitoring wells, soil and groundwater sampling and analysis, completion of aquifer tests, and a field verified well survey of groundwater users in the area of the Project.

The Quaternary deposits in the region consist of preglacial, lacustrine, aeolian, and fluvial deposits. The preglacial Beverly Channel, which has been infilled with sand and gravel deposits (Empress Formation), is the most widely used aquifer in this area. The preglacial Empress Formation sands and gravels are interpreted to have been deposited in fast-flowing, braided streams collectively named the Beverly Channel. The Beverly Channel originates in the Rocky Mountains and generally trends east towards its confluence with the preglacial Helina valley near Cold Lake. In the Fort Saskatchewan area, the Beverly Channel trends southwest-northeast and approximately follows the present day alignment of the North Saskatchewan River. The Empress Formation deposits which infill the Beverly Channel commonly follow a sedimentary sequence of gravel grading to sand followed by silt and clay.

Uppermost bedrock beneath the site is comprised of shales of the Oldman Formation and lacks the basal sandstone typical of the Belly River Group (Stein, 1976). Based on borehole log data (Thurber 2013), bedrock beneath the site is expected to be at a depth of approximately 27 m below ground level (BGL). Glacial till deposits are present beneath the site with a thickness of up to 24 m. The borehole logs appear to indicate that glaciolacustrine deposits are absent beneath the site. Glaciolacutrine deposits are generally present above the till to the west of the site consisting of higher plasticity silty clays that are more homogenous than the till.

Water availability in the till is limited, as the majority of the unit consists of low permeability clay and silt. However, significant sand lenses with thicknesses of up to 8.6 m are noted within the glacial till. Groundwater flow within the till is restricted to horizontal flow through these higher permeability sands and slow vertical flow downward due to the vertical hydraulic gradient between the till and the Beverly Channel aquifer.

The surficial sediments beneath the site consist of aeolian and/or glaciolacustrine sand. The thickness of the surficial sands encountered during drilling varied from 0 to 15 m. The majority of the sand encountered near the ground surface is well sorted fine grained sand indicative of aeolian deposition.

Where present, the surficial sand deposits are variably saturated across the site. The majority of the saturated surficial sands are restricted to the northwest corner of the site with surficial sands in the other areas generally not present or dry.

The potentiometric surface of the Project site, (i.e., the surface representing the hydraulic head of ground water), generally mimics the topography of the site with elevations ranging from

approximately 625 m ASL in the southeast corner of the site to 618 m ASL in the center of the site in the area around the wetland (W3). The potentiometric surface appears to be strongly influenced by the wetland (W3) in the center of the quarter section.

At the time of the hydrogeological assessment, groundwater flow was toward the wetland (W3) in the center of the quarter section. Groundwater flow in the dry periods flows toward the wetland (W3) as a result of the loss of water from the wetland due to evapotranspiration. During periods of high runoff, the wetland would recharge the aquifer and the primary direction of horizontal groundwater flow would likely be northwest toward Astotin Creek.

AESL is incorporating relevant data from the site investigation into the design of the brine pond, including the installation of an impervious liner, primary and secondary leak detection, and groundwater monitoring. AESL will also follow codified practice in the design and drilling of the salt cavern injection wells, including installation of surface casing across the base of groundwater protection. As a result, the Project is not anticipated to have an adverse effect on local groundwater resources.

5.1.7 Surface Water and Aquatic Resources

The Project is within the NSR watershed, which is part of the Saskatchewan River Basin. The NSR is a glacier-fed river that flows east from the Canadian Rockies to central Saskatchewan. The Project area is located approximately 5 km east of the NSR and east of the lower portion of Astotin Creek in an area consisting of agricultural field and mixed industrial land use. Astotin Creek is the closest permanent water body which supports fish and fish habitat, as defined by the *Fisheries Act*, and aquatic life, as defined by the *Species at Risk Act*. Astotin Creek is located approximately 400 m from the Project area boundary.

There are no surface waterbodies or watercourses present on the Project site, with the exception of three Class IV seasonal wetlands and two livestock sewage lagoons. As discussed in 5.1.4, AESL plans to infill one of the wetlands (W2) and use another for stormwater and groundwater basin storage (W3), while the third wetland will not be disturbed as part of the Project (W1). The lagoons will be removed during construction of the Project. AESL has submitted *Water Act* applications for the proposed infilled wetland (W2) and will provide compensation for the loss of wetland function, as prescribed by ESRD and in cooperation with Strathcona County.

Runoff across the Project area generally drains into the central depressional area (wetland W3 as per 5.1.4). Most of the Project site drains naturally toward wetland W3 which will be used as a stormwater management facility for the Project. Grading will take place as necessary to achieve positive drainage of all developed areas to drain towards this existing wetland. Discharge from the wetland (W3) is not expected to occur. The wetland (W3) has adequate capacity to function as a Stormwater Management Facility for the Project, and it is large enough to contain the 100-year 24-hour rainfall event, even when the water level is at the wetland boundary.

AESL currently holds a *Water Act* license to divert water from the NSR for industrial and storage cavern purposes. No amendments to the water diversion licenses for withdrawal from the NSR will be required for the Project.

Because there are no permanent or fish bearing water bodies on the Project site, and because of the capacity of the wetland (W3) to function as a stormwater management facility, the Project is not expected to interact with aquatic life, including fish and fish habitats.

In accordance with EPEA approvals required for industrial projects in Alberta, ESRD will regulate wastewater quantity and quality, runoff control, and stormwater management under the EPEA Approval to be granted for the Project.

With the implementation of the Project design measures proposed by AESL, and anticipated approval conditions, the Project is not expected to have adverse environmental effects on surface water flows or surface water quality.

5.1.8 Air Quality

The Project site is located within the boundaries of the North Saskatchewan Air Zone, which includes both the Capital Region Airshed Zone and the Fort Air Partnership (FAP) Airshed Zone. The North Saskatchewan Air Zone is characterized by a strong industrial base of oil refineries, chemical manufacturing, and power generation. Future industrial activity in the region is also expected to include NGL terminalling and processing as well as additional bitumen upgrading. Current industrial activity, in combination with vehicle use, home heating and urban activity, results in local and regional emissions of NO_2, SO_2, $PM_{2.5}$ and O_3.

Air quality within the Capital Region is monitored by several organizations, including ESRD, the FAP and the Strathcona Industrial Association. The Project area lies within the FAP Airshed Zone, which collects air quality data through a combination of 8 continuous and 62 passive monitoring stations.

There will be no continuous air emissions associated with the Project. Intermittent air emissions as a result of the Project will consist of products of combustion and will be minor and limited to:

- Small volumes of hydrocarbons, de-gassed from the brine prior to storage in the brine pond. Recovery of hydrocarbons from the brine will be required infrequently and only in upset conditions. Hydrocarbon volumes will be small and will be flared on site. Flaring of degassed hydrocarbons will follow AER's Directive 60: Upstream Petroleum Industry Flaring, Incinerating and Venting; and
- Emissions from dehydration activities will be captured and incinerated on site and managed in accordance with guidance from the AER and the Canadian Association of Petroleum Producers (CAPP).

The Project is not expected to result in additional adverse environmental effects on air quality relative to baseline conditions as the emissions from the Project will be in small volumes and will be captured and flared.

5.1.9 Noise

The Project work will contribute to noise levels in the area during the construction and operation phases. AESL conducted a noise impact assessment for the Project in accordance with AER Directive 38 Noise Control and is in the process of assessing the results.

All noise emissions from the Project will comply with AER Directive 38. Compliance with Directive 38 will be demonstrated through conformance with the Regional Noise Model developed though the NCIA, in collaboration with the AER. The Project will comply with noise level requirements of the NCIA RNMP, Strathcona County noise bylaws, and any potential conditions within the Development Permit issued by the County for the Project.

Given the presence of numerous industrial facilities in the area, planned installation of noise abatement measures as required, and AESL's commitment to comply with the requirements of AER Directive 38, the Project is not expected to contribute to ambient noise levels in the area.

5.1.10 Historical Resources

The Project area does not have historic resource values, and given its distance from the NSR, and that it has been under agricultural land use for more than 40 years, the potential for intact and significant historical resources is low. AESL will apply for a Historical Resources Assessment clearance from Alberta Culture. AESL will implement any recommendations from Alberta Culture prior to construction of the Project.

Numerous previous Historical Resources Assessments have been conducted in the region of the Project, none of which identified significant historical resource sites (see Figure 3-2). Additionally, the Project area is composed of lands highly disturbed by agriculture and industrial activities. It is unlikely that intact, previously unrecorded historic resource sites will be impacted by the Project.

5.2 CHANGES THAT MAY BE CAUSED BY THE PROJECT TO FISH AND FISH HABITAT, LISTED AQUATIC SPECIES AND MIGRATORY BIRDS

5.2.1 Fish and Fish Habitat, as Defined in the Fisheries Act

As discussed in Section 5.1.7, the closest permanent water body which supports fish and fish habitat is approximately 400 m from the closest site perimeter, and stormwater will be diverted to the onsite wetland (W3). There are no surface waterbodies or watercourses present on the Project site, with the exception of three Class IV seasonal wetlands and two livestock sewage lagoons. As discussed in 5.1.4, AESL plans to infill one of the wetlands (W2) and use another for stormwater basin storage (W3), while the third wetland will not be disturbed (W1). The lagoons

will be removed during construction of the Project. AESL has submitted a *Water Act* application for the proposed infilled wetland (W2) and will provide compensation for the loss of wetland function, as prescribed by ESRD.

Most of the Project site drains naturally toward wetland W3 which will be used as a stormwater management facility for the Project. Grading will take place as necessary to achieve positive drainage of all developed areas to drain towards this existing wetland. Discharge from the wetland (W3) is not expected to occur as it is large enough to contain the 100-year 24-hour rainfall event, even when the water level is at the wetland boundary.

Additionally, no overflow of the brine pond would be generated by a rainfall event which could otherwise impact surface or groundwater runoff. The brine pond is built to a capacity in excess of the maximum amount of brine it would be required to contain. Brine can also be pumped from the pond to the disposal wells to manage the brine level in the pond.

Because there are no permanent or fish bearing water bodies on the Project site, and because of the capacity of the wetland (W3) to function as a stormwater management facility, the Project is not expected to interact with fish and fish habitats. Because the Project is not expected to interact with fish and fish habitat, the Project is not expected to adversely affect fish or fish habitat, as defined in the *Fisheries Act*.

5.2.2 Aquatic Species, as Defined in the *Species at Risk Act* (SARA)

There were no aquatic species, as defined under SARA, observed on the Project site during the wetland assessment. Additionally, there is no high suitability habitat for aquatic species in the Project area, given its current agricultural and industrial land use.

As discussed in Section 5.1.7, and similar to the 5.2.1, the closest permanent water body which supports aquatic life is approximately 400 m from the closest site perimeter, and stormwater will be diverted to the onsite wetland (W3). There are no surface waterbodies or watercourses present on the Project site, with the exception of three Class IV seasonal wetlands and two livestock sewage lagoons. As discussed in 5.1.4, AESL plans to infill one of the wetlands (W2) and use another for stormwater basin storage (W3), while the third wetland will not be disturbed (W1). The lagoons will be removed during construction of the Project. AESL has submitted a *Water Act* application for the proposed infilled wetland (W2) and will provide compensation for the loss of wetland function, as prescribed by ESRD.

Most of the Project site drains naturally toward wetland W3 which will be used as a stormwater management facility for the Project. Grading will take place as necessary to achieve positive drainage of all developed areas to drain towards this existing wetland. Discharge from the wetland (W3) is not expected to occur as it is large enough to contain the 100-year 24-hour rainfall event, even when the water level is at the wetland boundary.

Additionally, no overflow of the brine pond would be generated by a rainfall event which could otherwise impact surface or groundwater runoff. The brine pond is built to a capacity in excess of the maximum amount of brine it would be required to contain. Brine can also be pumped from the pond to the disposal wells to manage the brine level in the pond.

Because there are no permanent or fish bearing water bodies on the Project site, and because of the capacity of the wetland (W3) to function as a stormwater management facility, the Project is not expected to interact with aquatic life. Because the Project is not expected to interact with aquatic life, the Project is not expected to adversely affect aquatic species at risk, as defined under *SARA*.

5.2.3 Migratory Birds, as Defined in the *Migratory Birds Convention Act*

As per the details provided in 5.1.4 and 5.1.5, the Project is not expected to adversely affect migratory birds, as defined in the Migratory Birds Convention Act.

No high suitability bird habitat has been identified within the Project area (as per 5.1.5). Wildlife observations conducted during the wetland assessments found no provincially or federally listed species (as under the *Alberta Wildlife Act* and the *Species at Risk Act*, and as per the Committee on the Status of Endangered Wildlife in Canada). As described in 5.1.4, construction of the Project will result in impacts to two existing wetlands on site (W2 will be removed and W3 will be used as a stormwater basin). Both of these wetlands have been previously affected by agricultural practices and consequently, are considered to provide marginal habitat for migratory birds.

As per 5.1.5, any vegetation clearing in areas where migratory birds could be present will be done to comply with appropriate restricted activity period requirements, and in the event that site clearing is scheduled to occur within any breeding bird window, nest sweeps will be conducted by a qualified biologist to identify active nests and any required action or protocols will be taken.

AESL will implement mitigation measures to limit the effects of development on the wetlands identified on site, as required by the *Water Act* applications, including a wetland compensation program which will be undertaken to offset the loss of wetland function as a result of the Project. AESL will consult with ESRD to implement an appropriate compensation program, in accordance with the Government of Alberta's Wetland Policy (2014) and input from Strathcona County (refer to 5.1.4)

The brine pond will be designed with measures that will deter birds from using the pond for roosting, nesting, foraging or resting. It will be lined with double high density polyethylene (HDPE) liners that will extend from the interior of the pond, to approximately 1 m across the top of the pond berm where they will be anchored in a trench. The remainder of the pond berm top, which is 5 m in total width, will have gravel surfacing suitable for pedestrian and light vehicle

access. The lack of a vegetated margin on the edge of the pond and on top of the pond berm will deter nesting and feeding activity by waterfowl.

It is anticipated that birds will be preferentially attracted to the more suitable habitat provided by either the 5.22 ha natural wetland (W3) that will be retained on the Project site, or to the extensive wetlands (including W1) associated with Astotin Creek, 15 ha of which are located approximately 400 metres to the north of the brine pond.

In addition, four operators of cavern storage facilities exist in the area, some with multiple brine ponds of similar size to the proposed brine pond, and no adverse effects on birds have been observed by these operators. These operators have no specific bird deterrent systems in place.

Because of the proximity of preferential habitat, the lack of vegetated margin, and the positive experience of other brine pond operators in the area, in addition to the small surface area of the Project, the existing level of industrial development in the area, and the removal of hydrocarbons from the brine prior to storage in the pond as discussed in 5.1.5, the brine pond is not expected to adversely affect migratory birds, as defined under the *Migratory Birds Contravention Act*. AESL will conduct increased monitoring of the brine pond for the first two years of its operation to confirm that migratory birds and other wildlife are not impacted. Should any indication of an adverse effect on wildlife arise, AESL will consider the installation of further deterrents, such as effigies, at the perimeter of the pond.

5.3 CHANGES THAT MAY BE CAUSED BY THE PROJECT TO FEDERAL LANDS OR LANDS OUTSIDE OF ALBERTA

The closest federal land is Elk Island National Park, approximately 13 km southeast of the Project. As described in section 5.1.8, air emissions from the Project are anticipated to be intermittent, local and negligible. As a result, the Project is not expected to have any interaction with Elk Island National Park or other federal lands, nor is the Project expected to have any adverse environmental effects outside of Alberta.

5.4 CHANGES THAT MAY BE CAUSED BY THE PROJECT TO ABORIGINAL PEOPLES RESULTING FROM CHANGES TO THE ENVIRONMENT

The Project will not require access to, use of, or the exploration, development, and production of resources or lands currently used for traditional purposes by Aboriginal peoples. The closest First Nation Reserve is the Alexander First Nation (Treaty Six) on Indian Reserves 134, 134A and 134B located 51 km west of the Project. As such, the Project is not expected to adversely affect Aboriginal peoples. Refer to Tables 6-1 and 6-2 and Figure 3-3 for additional information on First Nations and Metis Settlements within 100 km of the Project and to section 6.0 for details relating to notification and consultation with the various Aboriginal groups in proximity to the Project.

6.0 Proponent Engagement and Consultation with Aboriginal Groups

6.1 LIST OF POTENTIALLY AFFECTED AND INTERESTED ABORIGINAL GROUPS

Where used in the Project Description, "Aboriginal groups" is inclusive of both First Nations and Métis groups.

AESL has identified four First Nations within 100 km of the Project (Table 6-1) and will work with these and any other First Nations as appropriate to address their interests. Based on ATCO experience working with Treaty 6 First Nations and First Nation consultation efforts of recently proposed projects in the AIH region, AESL has identified Alexander First Nation and Saddle Lake Cree Nation as potentially interested in the Project.

Table 6-1 First Nations in Proximity to the Project

First Nation	Distance from Project Site	Address
Alexander First Nation	NW 51 km	Box 3480, Morinville, AB T8R 1S3
Saddle Lake Cree Nation	NE 91 km	Box 696, Saddle Lake, AB T0A-3T0
Enoch Cree Nation	SW 60 km	#440, PO Box 543, Enoch, AB T7X 3Y3
Paul First Nation	West 90 km	PO Box 30, Duffield, AB T0E 0N0

Refer to Figure 3-3 for the locations of the First Nation communities identified in Table 6-1.

The Metis Nation of Alberta is divided into six regions within which there are eight Metis communities. AESL has identified two of these, the Metis Nation Region 2 in central eastern Alberta and the Metis Nation Region 4 in central western Alberta, as potentially interested in the Project (Table 6-2).

Table 6-2 Metis Nation Regions in Proximity to the Project

Metis Nation	Address
Metis Nation of Alberta	*#100, 11738 Kingsway Ave, Edmonton, AB T5G 0X5*
Metis Nation of Alberta - Region 2	PO Box 6497, Bonnyville, AB T9H 2H1
Metis Nation of Alberta - Region 4	11724 - 95 Street, Edmonton, AB T5G 1L9

6.2 DESCRIPTION OF ENGAGEMENT OR CONSULTATION ACTIVITIES CARRIED OUT TO DATE WITH ABORIGINAL GROUPS

AESL held an open house on October 3, 2013 to provide Project information to and seek input from interested parties. (Refer to section 7 for open house details). In addition to landowners and industry, one Aboriginal Group (Saddle Lake Cree Nation) was present at the open house. No concerns were brought forward.

AESL has submitted packages for the notification of the Project to the Aboriginal groups identified in Tables 6-1 and 6-2. These packages included information regarding the scope of the Project, Project location, Project schedule, participant consultation, AESL Project contacts and information specific to the ATCO companies' existing presence and operations in the AIH, information on emergency response, and the AER information packages as required by AER Directive 56.

In addition to the regulatory notification and consultation requirements of the AER and ESRD, AESL will follow the Government of Alberta's First Nations Consultation Policy on Land Management and Resource Development (May 16, 2005) and Alberta's First Nations Consultation Guidelines on Land Management and Resource Development (November 14, 2007), as applicable.

Ongoing engagement activities with Aboriginal groups regarding the Project will occur throughout development.

AESL is in the process of submitting a First Nations Consultation (FNC) Assessment Request to the Government of Alberta for their consultation intensity recommendation for the Project. Once a response is provided, AESL will follow the recommendation of the Government of Alberta.

Where consultation is recommended, AESL will develop a consultation plan to include:

- Engagement and consultation activities and timelines;
- Processes for addressing issues and concerns;
- Mechanisms to incorporate information and feedback into the Project design;

6.3 KEY COMMENTS AND CONCERNS BY ABORIGINAL GROUPS

To date, no First Nations or Metis communities have brought forward or indicated any specific concerns with the Project.

6.4 CURRENT ABORIGINAL TRADITIONAL LAND USE

As previously discussed, the Project area is located in the AIH, an area of the Province that has been designated for industrial use. The Project area is a 160 acre parcel that has been continually farmed and cultivated since it was first homesteaded in the early 1900s. The Project area contains low suitability habitat for wildlife species and vegetation species. Additionally, the lands are privately owned and no traditional uses of the Project site by Aboriginal groups or peoples have been identified in previous regional studies for the area (Stantec 2010; Stantec 2013).

AESL will submit a Historical Resources Act (HRA) clearance request for the Project area.

6.5 ABORIGINAL CONSULTATION AND INFORMATION GATHERING PLAN

See Section 6.2 for a description of Aboriginal consultation and information gathering.

Proponent Engagement and Consultation with Aboriginal Groups
July 2014

7.0 Consultation with the Public and Other Parties (other than Aboriginal Consultation included above)

7.1 STAKEHOLDERS AND RELATED CONSULTATION ACTIVITIES

7.1.1 Potentially Affected and Interested Stakeholders

Non-Aboriginal stakeholders identified by AESL who may be potentially affected and/or have an interest in the Project are listed in Table 7-1.

Table 7-1 Stakeholders who may be Potentially Affected and/or Interested in the Project

Federal Government	Canadian Environmental Assessment Agency
Provincial Government	Alberta Environment and Sustainable Resource Development Alberta Energy Regulator
Municipal Government	Strathcona County City of Fort Saskatchewan Town of Bruderheim
Local Landowners, Residents and Occupants	All landowners, residents and occupants within 1.5 km of the Project site boundary and residents along the pipeline right of way
Regional Associations	Alberta Industrial Heartland Association Northeast Capital Industrial Association Fort Air Partnership

Landowners, residents and occupants include private residents, farmers, various local industries, natural gas and oil pipeline companies, and electric and gas distribution utilities.

Those stakeholders who may be potentially affected and/or interested in the Project have been or will be included in discussions relating to the Project. For a list of those stakeholders consulted to date, refer to Table 1-1.

7.1.2 Overview of Stakeholder Consultation Activities to Date

AESL has commenced consultation activities in accordance with AER Directives and to meet the requirements of legislation governing salt cavern development, as identified in section 1.3.

Consultation activities undertaken to date with respect to the Project include Project notification, personal consultation, a Project open-house, and other activities. These consultation activities are described in sections 7.1.2.1 to 7.1.2.4.

7.1.2.1 Project Notification

- In mid-July 2013, AESL mailed a Project Information Package to landowners, mineral rights holders, occupants and residents within a 1.5 km radius of the Project site boundary
- The Project Information Package included information regarding the scope of the Project, Project location, Project schedule, participant consultation, AESL Project contacts and information specific to the ATCO companies' existing presence and operations in the AIH
- The materials distributed by mail were also made available on AESL's website (http://www.atcoenergysolutions.com/Projects/Heartland-Energy-Storage-and-Logistics)

7.1.2.2 Personal Consultation

- Throughout July to September 2013, AESL conducted personal consultations with all land interest holders, including occupants, residents, landowners and caveat holders within 800 m of the Project site boundary
- The purpose of the consultations was to explain the proposed Project, answer questions and address concerns
- AESL representatives recorded all participant questions and feedback, and provided additional information where it was requested
- AESL documented the communications and no objections were raised

7.1.2.3 Project Open House

AESL held a Project open house in the hamlet of Josephburg on October 3, 2013. It was attended by 56 people.

In addition to invitations sent to the specific stakeholders noted in this document, the open house was advertised in two local weekly distribution newspapers: the Fort Saskatchewan Record and the Lamont Leader. These advertisements provided AESL contact information and encouraged those unable to attend the open house to share their questions or concerns about the Project, or request further information, by contacting AESL directly.

7.1.2.4 Other

Early consultation activities included discussions with municipal, provincial and federal government officials. Meetings were held with representatives from Strathcona County, the Canadian Environmental Assessment Agency (CEA Agency), ESRD and the AER, each of which are responsible for administering legislation applicable to the Project. The purpose of these meetings was to introduce and inform these parties of the Project scope and seek guidance regarding regulatory processes applicable to the Project.

The CEA Agency provided a letter to AESL dated April 8, 2014, in which the CEA Agency determined that a Project Description must be filed for the Project Refer to Appendix A for a copy of the letter.

7.2 KEY COMMENTS AND CONCERNS BY STAKEHOLDERS

No objections, significant issues, or concerns have been raised by industry, general public or other stakeholders with respect to the proposed Project. General interest inquires and requests for information have been responded to by AESL with no specific follow up concern from the interested parties. Confirmation of non-objection was obtained and is available from all required parties.

Notification and consultation have been conducted in compliance with AER Directives 056 and 065.

7.3 OVERVIEW OF ANY ONGOING OR PROPOSED STAKEHOLDER CONSULTATION ACTIVITIES

Consultation activities will continue throughout all phases of the Project. Local stakeholders will be consulted prior to key Project milestones, including construction and commissioning. Ongoing consultation will occur consistent with the requirements of AER Directive 56.

AESL has developed positive relationships with local stakeholders and will continue to work with these stakeholders to communicate changes and/or updates to the Project.

7.4 CONSULTATIONS WITH OTHER JURISDICTIONS

Consultation with the provincial regulators, including AER and ESRD, began in June 2013 to provide an introduction to AESL and the Project, and to obtain information on regulatory processes that were required to be followed. Ongoing dialogue with the AER with respect to the regulatory processes for the Project is ongoing.

Meetings with Strathcona County have been held to provide an introduction to AESL and the Project and to discuss Strathcona County's development permitting process. On May 6, 2014, AESL met with the County of Strathcona to review Development Permit requirements for the Project. Further consultation will be held with the County of Strathcona as the Project progresses.

Consultation with CEAA began in March, 2014 to provide an introduction to AESL, the proposed project, and to gain guidance on the CEAA process for the project. On March 26, AESL met with CEAA to present the project for initial determination as to the applicability of CEAA 2012 to the Project. By letter response dated April 8 2014, and attached as Appendix 1, CEAA advised the Project is a Designated Project under CEAA 2012 and a Project Description was required to be filed with CEAA for review.

A complete list of consultation with other jurisdictions includes Tables 1-1 and 7-1.

Consultation with the Public and Other Parties (other than Aboriginal Consultation included above)
July 2014

8.0 References

AENV (Alberta Environment). 1994. *Environmental Protection Guidelines for Pipelines*. Conservation and Reclamation Information Letter. C&R/IL/94-5. Available at: http://environment.gov.ab.ca/info/library/6830.pdf. Accessed: May 2014.

AER (Alberta Energy Regulator). 2013. Directive 038: Noise Control. Released February 16, 2007. Calgary, Alberta. Available at: http://www.aer.ca/rules-and-regulations/directives/directive-038. Accessed: May 2014.

Alberta Tourism Parks and Recreation. 2012. *Natural Regions and Subregions of Alberta*. Prepared by the Natural Regions Committee. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852. Available at: http://albertaparks.ca/media/2942026/nrsrcomplete_may_06.pdf. Accessed: May 2014.

ATCO. 2014. ATCO Corporate Structure. Accessed June 2014, from: http://www.atco.com/About-Us/Corporate-Profile/Corporate-Structure

Cohen, A., Decarlo, N. and Shaughnessy, B. 2013. Wetland Assessment for Wetlands within SW¼ 34-55-21 W4M, Strathcona County, Alberta. Stantec Consulting Ltd.

D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852. Available at: http://albertaparks.ca/media/2942026/nrsrcomplete_may_06.pdf. Accessed: May 2014.

ESRD (Alberta Environment and Sustainable Resource Development). 2013. *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body*. Made under the *Water Act* and the Water (Ministerial) Regulation. Consolidated to include amendments in force as of June 24, 2013. Edmonton, Alberta. Available at: http://www.qp.alberta.ca/documents/codes/pipeline.pdf. Accessed: May 2014

ESRD (Alberta Environment and Sustainable Resource Development). 2012. North Saskatchewan Regional Plan. Accessed June 2014, from: https://landuse.alberta.ca/RegionalPlans/NorthSaskatchewanRegion/Pages/default.aspx

Natural Regions Committee. 2006. *Natural Regions and Subregions of Alberta*. Compiled by

Stantec (Stantec Consulting Ltd.). 2010. Shell Quest Carbon Capture Environmental Impact Assessment. Prepared by Stantec Consulting Ltd. for Shell Canada. Calgary, Alberta.

Stantec (Stantec Consulting Ltd.). 2013. Canada Gas-to-Liquids Project Environmental Impact Assessment. Prepared by Stantec Consulting Ltd. for SASOL Canada Holdings Limited. Calgary, Alberta.

Stein, R. 1976. *Hydrogeology of the Edmonton Area (Northeast Segment), Alberta*. Earth Sciences Report 1976-01. Report 76-1. Alberta Research Council. Available at: http://www.ags.gov.ab.ca/publications/ESR/PDF/ESR_1976_01.PDF. Accessed: May 2014.

Strathcona County. 2001. *Strathcona County Alberta's Industrial Heartland Area Structure Plan*. Bylaw 65-2001. Schedule "A". Revised May 29, 2001. Available online at: http://www.strathcona.ca/files/files/attachment-pds-asp-heartland-65-2001.pdf. Accessed November 11, 2013.

Strathcona County. 2002. *Strathcona County Alberta's Industrial Heartland Area Structure* Plan - Amendment. Bylaw 50-2002. Schedule "A". Available online at: http://www.strathcona.ca/files/files/attachment-pds-asp-heartland-50-2002.pdf. Accessed November 11, 2013.

Strathcona County. 2007. *Municipal Development Plan Bylaw 1-2007*. Approved May 22, 2007. Available online at: http://www.strathcona.ca/departments/planning-development-services/zoning-and-planning-documents/municipal-development-plan-bylaw-1-2007/. Accessed November 11, 2013.

Thurber (Thurber Engineering Ltd.). 2013. ATCO Salt Caverns Expansion Brine Ponds, Fort Saskatchewan, Alberta: Preliminary Geotechnical and Hydrogeological Investigation. Report to ATCO Energy Solutions Ltd. Edmonton, Alberta.

9.0 Acronyms

Acronym	Definition
ACIMS	Alberta Conservation Information Management System
AENV	Alberta Environment
AEP	Alberta Environmental Protection
AER	Alberta Energy Regulators
AESL	ATCO Energy Solutions Limited
AHIA	Alberta Heartland Industrial Association
AIH	Alberta's Industrial Heartland
AIHA	Alberta Industrial Heartland Association
ASRD	Alberta Sustainable Resource Development
AUC	Alberta Utilities Commission
CEA	Canadian Environmental Assessment
CEAA	*Canadian Environmental Assessment Act*
DFO	Fisheries and Oceans Canada
EPEA	*Environmental Protection and Enhancement Act*
ESA	Environmental Significant Area
ESRD	Alberta Environment and Sustainable Resources Development
EUB	Alberta Energy and Utilities Board
FAP	Fort Air Partnership
KWBZ	Key Wildlife Biodiversity Zone
LPG	Liquefied Petroleum Gas

Acronyms
July 2014

Acronym	Definition
LSD	Legal Sub-Division
NAV Canada	Navigation Canada
NCIA	Northeast Capital Industrial Association
NGL	Natural Gas Liquid
NIA	Noise Impact Assessment
NSR	North Saskatchewan River
NSRP	North Saskatchewan Regional Plan
NSWA	North Saskatchewan Watershed Alliance
PSL	Permissible Sound Level
RNMP	Regional Noise Management Plan
RSA	Regional Study Area
SARA	*Species at Risk Act*

Appendix A Canadian Environmental Assessment Agency Letter Regarding Project Review Process

Appendix A Canadian Environmental Assessment Agency Letter Regarding Project Review Process
July 2014

Canadian Environmental Assessment Agency | Agence canadienne d'évaluation environnementale

CDI Building
#425, 10115 - 100A Street
Edmonton, Alberta T5J 2W2

Édifice CDI
#425, 10115 – rue 100A
Edmonton (Alberta) T5J 2W2

April 08, 2014 Agency File No.:

Justin Heskes
Project Manager, Infrastructure Development
ATCO Energy Solutions
200, 919-11 Avenue SW
Calgary, AB T2R 1P3

Dear Mr. Heskes:

SUBJECT: ATCO Energy Salt Cavern Project

Thank you for your correspondence of March 28, 2014. Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), a federal environmental assessment may be required for projects designated in CEAA 2012's *Regulations Designating Physical Activities* (the Regulations). Under paragraph 14(*f*) of the Schedule to the Regulations, the construction, operation, decommissioning and abandonment of a new liquefied petroleum gas storage facility with a storage capacity of 100 000 m^3 or more is a designated project.

ATCO Energy Solutions has asked the Canadian Environmental Assessment Agency (the Agency) four specific questions in relation to the proposed project:

Question 1: Is a storage cavern a "facility"?

Based on the information provided, the Agency has determined that the salt caverns and associated above-ground infrastructure would constitute a "*storage facility"* within the meaning of paragraph 14(f) of the Regulations. Although the salt caverns themselves would not be constituted of man-made materials, they would nonetheless be constructed by way of an engineered process of solution mining. Once mined, the salt caverns and the associated above-ground infrastructure would be operated as an ongoing storage facility.

Question 2: Is the storage capacity assessed against the 100,000m^3 threshold for each cavern or against the cumulative storage capacity of all caverns being developed?

The Agency understands that ATCO Energy Solutions is proposing to construct four salt caverns each with a target storage capacity of 95,000 m^3. The Agency is of the view that the construction and operation of the four caverns together with associated above-ground infrastructure constitute a single storage facility. For the purposes of paragraph 14(f) of the Regulations, the total capacity for the entire storage facility is to be assessed against the prescribed 100 000 m^3 threshold. As a result, the cumulative total storage capacity of the four caverns will be considered.

Question 3: Which of the hydrocarbons planned for storage in the Project does the Agency consider liquefied petroleum gas (LPG)?

The Agency considers the reference to *"liquefied petroleum gas"* at paragraph 14(f) of the Regulations, to have the same meaning as the definition of "*liquefied petroleum gas"* set out in the *Liquefied Petroleum Gases Bulk Storage Regulations* made under the *Canada Transportation Act*: "*gases derived from petroleum or natural gas; they are in the gaseous state at normal atmospheric temperature and pressure, but may be maintained in a liquid state by the application of moderate pressure; the following gases are those most commonly handled as liquefied petroleum gases: propane, normal butane, propylene, isobutane, butylenes; (gaz de pétrole liquéfiés)*".

Canada

Question 4: Could AESL conduct routine well activities, including drilling and testing, for the purposes of completing scheme approval requirements for the Alberta Energy Regulator?

Exploratory drilling and testing activities are not physical activities described in the Regulations or incidental to described activities. As a result, ATCO would not need to submit a project description to the Agency for these activities. ATCO would be responsible for complying with all other applicable legislation that may apply to the exploratory drilling and testing activities.

Based on the information provided the Agency has determined that the ATCO Energy Solutions proposed Salt Cavern Storage Project would be considered a designated project under CEAA 2012.

Subsection 8(1) of CEAA 2012 requires the proponent of a designated project to submit a description of the project to the Agency. The information that must be included in a project description is set out in the *Prescribed Information for the Description of a Designated Project Regulations*. Based on that information, the Agency will determine whether a federal environmental assessment is required and, if so, ensure that such an assessment is conducted.

Should you require additional information, I can be contacted at sean.carriere@ceaa-acee.gc.ca or at (780) 495 2580.

Sincerely,

<Original signed by>

Sean Carriere
Project Manager
Prairie and Northern Region

Appendix B Legal Land Title for SW 34-55-21 W4M

Appendix B Legal Land Title for SW 34-55-21 W4M
July 2014

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0018 585 374	4;21;55;34;SW	122 423 202

LEGAL DESCRIPTION
MERIDIAN 4 RANGE 21 TOWNSHIP 55
SECTION 34
QUARTER SOUTH WEST
EXCEPTING THEREOUT ALL MINES AND MINERALS
AREA: 64.7 HECTARES (160 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE

MUNICIPALITY: STRATHCONA COUNTY

REFERENCE NUMBER: 012 009 693 +10

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
122 423 202	28/12/2012	TRANSFER OF LAND	$3,680,000	SEE INSTRUMENT

OWNERS

ATCO ENERGY SOLUTIONS LTD.
OF 800, 909-11 AVENUE SW
CALGARY
ALBERTA T2R 1L8

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
752 119 421	05/09/1975	UTILITY RIGHT OF WAY GRANTEE - LAMCO GAS CO-OP LTD.
072 052 641	27/01/2007	UTILITY RIGHT OF WAY GRANTEE - ATCO GAS AND PIPELINES LTD. AS TO PORTION OR PLAN:8420450
072 069 561	05/02/2007	UTILITY RIGHT OF WAY GRANTEE - ATCO GAS AND PIPELINES LTD. AS TO PORTION OR PLAN:0224801

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
112 044 399	15/02/2011	UTILITY RIGHT OF WAY GRANTEE - ATCO GAS AND PIPELINES LTD. AS TO PORTION OR PLAN:0927538

TOTAL INSTRUMENTS: 004

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 15 DAY OF APRIL, 2014 AT 08:07 A.M.

ORDER NUMBER: 25737521

CUSTOMER FILE NUMBER: SEC 34

END OF CERTIFICATE