



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

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Impact Assessment Agency of  
Canada Detailed Project  
Description

March 31, 2021

# ATCO

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always there. anywhere.

# DETAILED PROJECT DESCRIPTION

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

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### ABBREVIATIONS AND ACRONYMS

%	percent
AAAQO	Alberta Ambient Air Quality Objectives
ABSA	Alberta Boiler Safety Association
ACM	access and construction maps
AEP	Alberta Environment and Parks
AER	Alberta Energy Regulator
AES; ATCO Energy Solutions	ATCO Energy Solutions Ltd.
AIH	Alberta Industrial Heartland
AIHA	Alberta Industrial Heartland Association
ARO	asset retirement obligation
ATCO	ATCO Ltd.
C\$	Canadian dollar
Ca	Calcium
CAAQS	Canadian Ambient Air Quality Objectives
CH <sub>4</sub>	methane
Cl	chlorine
cm	centimetre
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalent
CO <sub>3</sub>	calcium carbonate
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSA	Canadian Standards Association
DFO	Fisheries and Oceans Canada
DPD	Detailed Project Description
E	east
EAS	Environmental Alignment Sheets
EC	electrical conductivity
ECCC	Environment and Climate Change Canada
EIA	Environmental Impact Assessment
EPEA	<i>Environmental Protection and Enhancement Act</i>
EPP	Environmental Protection Plan
ERCB	Energy Resources Conservation Board
ESA	Environmentally Significant Area
ESC	Erosion and Sediment Control
FAP	Fort Air Partnership
Fe	iron
FNCAA	First Nation Consultation Adequacy Assessment
FTE	full time equivalent
g/L	grams per litre

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GDP	gross domestic product
GHG	greenhouse gas
GoA	Government of Alberta
H <sub>2</sub> S	hydrogen sulphide
ha	hectare
HCO <sub>3</sub>	bicarbonate
HDD	Horizontally Directionally Drill
HDPE	high-density polyethylene
HRA	<i>Historical Resources Act</i>
IAA	Impact Assessment Agency of Canada
IAAC	Impact Assessment Agency of Canada
IFRS	International Financial Accounting Standards
IPD	Initial Project Description
JV	joint venture
K	potassium
K-12	Kindergarten to Grade 12
km	kilometre
km/h	kilometres per hour
kPa	kilopascal
kt CO <sub>2</sub> e	kilotonnes of carbon dioxide equivalent
kW	kilowatt
KWBZ	Key Wildlife Biodiversity Zone
LEEP	Legislated Employment Equity Program
LLR	Licensee Liability Rating
LNG	liquid natural gas
m	metre
m/s	metres per second
m <sup>3</sup>	cubic metre
Mg	magnesium
mm	millimetre
Mn	manganese
MOU	memorandum of understanding
N	north
N <sub>2</sub> O	nitrous oxide
Na	sodium
NCIA	Northeast Capital Industrial Association
NE	northeast
NGL	natural gas liquids
NO <sub>2</sub>	nitrogen dioxide
NO <sub>3</sub>	nitrate
NW	northwest

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O <sub>3</sub> .....	ozone
OGCA.....	<i>Oil and Gas Conservation Act</i>
OH .....	oxyhydride
OMS .....	Operations, Maintenance, and Surveillance
PM <sub>2.5</sub> .....	Fine Particulate
Q1.....	first quarter
Q2.....	second quarter
Q3.....	third quarter
Q4.....	fourth quarter
ROW .....	right-of-way
S .....	south
SACC.....	Strategic Assessment of Climate Change
SARA.....	<i>Species at Risk Act</i>
SE .....	southeast
SO <sub>2</sub> .....	sulphur dioxide
SO <sub>4</sub> .....	sulfate
SW .....	southwest
tCO <sub>2</sub> e.....	tonnes of carbon dioxide equivalent
TDS .....	total dissolved solid
the Project.....	ATCO Salt Cavern Storage Expansion Project
UNDRIP .....	United Nations Declaration on the Rights of Indigenous Peoples
W.....	west
W3.....	Wetland W3
W4M .....	West of 4 <sup>th</sup> Meridian
WCCOG .....	Western Canada Cavern Operators Group
WMF .....	Water Management Framework



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## INTRODUCTION

ATCO Energy Solutions Ltd. (AES; ATCO Energy Solutions), a division of the ATCO Group of Companies (ATCO), is pleased to submit this Detailed Project Description (DPD) for the ATCO Salt Cavern Storage Expansion Project (the proposed Project; the Project). The Project is an expansion of the existing Strathcona Salt Cavern Storage Facility, which consists of four underground natural gas liquids (NGL) storage caverns. The Project will add four additional storage caverns. The Project is proposed to be located on an existing industrial site on lands that are owned by AES. The local area is zoned for heavy industrial use, and the Project lands and surrounding lands are privately owned and generally cultivated or developed. The Project requires limited surface disturbance and infrastructure, and expected effects associated with operation of the Project are minimal.

In accordance with the *Impact Assessment Act*, AES submitted an Initial Project Description (IPD) to the Impact Assessment Agency of Canada (IAAC) for the Project on January 13, 2021. IAAC conducted public engagement on the IPD and solicited comments until February 16, 2021. Issues raised in the public engagement period were summarized by IAAC in a Summary of Issues document provided to AES on March 1, 2021.

Pursuant to subsection 15(1) of the *Impact Assessment Act*, this DPD responds to the issues identified in the Summary of Issues (Appendix A) and includes the information described in the *Information and Management of Time Limits Regulations, Schedule 2* (Information Regulations) under the *Impact Assessment Act*.

AES prepared a Screening Assessment (SA) in support of the DPD to qualify and evaluate certain potential environmental, health, social and economic effects, and impacts on Indigenous peoples and rights of Indigenous peoples that may result from the construction and operation of the proposed Project. The SA, in conjunction with the DPD, provides evidence that the proposed Project is not likely to cause adverse effects in areas of federal jurisdiction as defined in the *Impact Assessment Act*.

Using conservative assumptions, the DPD and the SA demonstrate that with the application of technically and economically practicable mitigation measures, the Project is unlikely to result in consequential adverse residual effects to the environment, or health, social or economic conditions in the local or regional area. In particular, the Project is unlikely to result in adverse effects to fish and fish habitat, aquatic species and migratory birds, or to Indigenous peoples, their current traditional land and resource use, physical and cultural heritage, or their rights. The low levels of greenhouse gas (GHG) emissions from the Project are not expected to cause changes to the environment outside the province or Canada or contribute materially to climate change.

Any residual effects of the Project will be monitored and managed in accordance with applicable provincial legislation and the terms and conditions of both existing and new regulatory approvals to be amended or obtained, respectively, for the Project. In the event that effects associated with the Project are greater than anticipated or result in exceedances of any applicable environmental thresholds, there are existing regulatory management systems and mechanisms in place that would apply, including the potential for compliance and enforcement measures to be taken by provincial and municipal regulators.

AES undertook an early consultation program for the Project with local residents, landowners, and occupants, Indigenous groups, regulatory authorities and other interested parties, and is committed to continuing engagement throughout the life cycle of the Project and will actively respond to and attempt to address any issues or concerns raised.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

In preparing the DPD and the SA, AES considered guidance and requirements in the *Strategic Assessment of Climate Change*, the *Impact Assessment Act Guide to Preparing an Initial Project Description and a Detailed Project Description*, the *Practitioner's Guide to Federal Impact Assessments under the Impact Assessment Act* and the *Tailored Impact Statement Guidelines Template for Designated Projects Subject to the Impact Assessment Act*.

A table identifying the sections of the DPD and SA that respond to the individual issues in the Summary of Issues is provided in Appendix A.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## PART A: UPDATED GENERAL INFORMATION

### 1. THE PROJECT'S NAME, TYPE OR SECTOR AND PROPOSED LOCATION

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#### *DPD Criteria*

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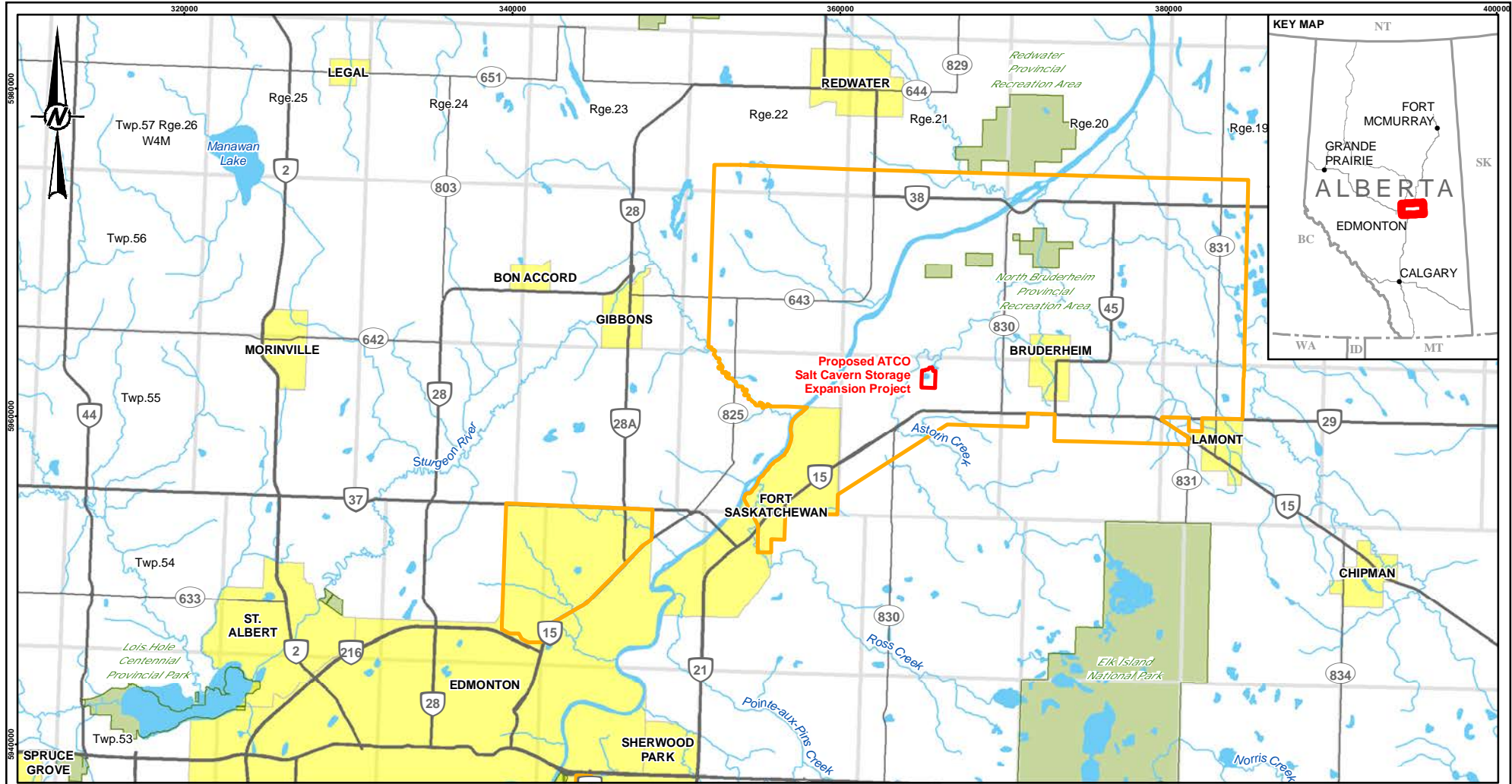
#### *The project's name, type or sector and proposed location.*

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ATCO Energy Solutions owns and operates the Strathcona Salt Cavern Storage Facility at SW 34-55-21-W4M in the Alberta Industrial Heartland (AIH). This existing facility consists of four NGL storage caverns, each with a capacity of approximately 100,000 m<sup>3</sup>. These caverns serve industrial customers in the AIH. A fifth cavern is currently under construction. Associated facilities at the site include a product handling facility, a brine pond, an office building, buried pipelines, access roads, and parking facilities.

The ATCO Salt Cavern Storage Expansion Project (the proposed Project; the Project), would expand this existing storage facility capacity with the development of four additional salt caverns to store NGLs. Each cavern would have a working capacity of approximately 100,000 m<sup>3</sup> for a total expansion size of approximately 400,000 m<sup>3</sup>. The proposed Project would also include associated surface facilities including a product handling facility, and a brine pond and would be located at the existing SW 34-55-21-W4M site and potentially extend onto NW 27-55-21-W4M or Lot 'D' of NW 34-55-21-W4M. The Project site would be wholly contained on private land owned by AES. The associated pipeline right-of-way (ROW) will be constructed on land privately owned by other industrial operators in the AIH. No portion of the Project is sited on Crown Land. The Project Location, in relation to the regional area, is shown in Figure 1.

The AIH is a joint land use planning and development initiative between five municipalities in the Edmonton Capital Region designed to attract investment to the region. It is the largest hydrocarbon processing region and one of the most established value-add manufacturing centres in Canada, making the region a critical partner in Canada's energy future (AIHA 2020). The AIH is guided by the Alberta Industrial Heartland Association (AIHA), a non-profit association of municipalities dedicated to sustainable eco-industrial development (AIHA 2020). 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 be held to some of the highest environmental standards in the world, including technologies for carbon capture and storage, emissions reduction, progressive energy technology that modernizes plastics production and emerging energy solutions (AIHA 2020).



- PROJECT SITE
- ALBERTA INDUSTRIAL HEARTLAND BOUNDARY
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- PARK / PROTECTED AREA
- POPULATION CENTRE
- TOWNSHIP
- WATERBODY



**REFERENCE(S)**  
 PARKS AND PROTECTED AREAS OBTAINED FROM ALBERTA PARKS, GOVERNMENT OF ALBERTA. HIGHWAYS, WATERCOURSES AND WATERBODIES OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. POPULATED PLACES © GOVERNMENT OF ALBERTA 2020. ALL RIGHTS RESERVED.  
 PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT  
**ATCO ENERGY SOLUTIONS**

CONSULTANT



YYYY-MM-DD	2021-03-30
DESIGNED	SL
PREPARED	NF
REVIEWED	CES
APPROVED	DV

PROJECT  
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**

TITLE  
**PROJECT LOCATION**

PROJECT NO.	CONTROL	REV.	FIGURE
123513692-0002		0	1

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM ANSIA

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 2. PROPONENTS NAME AND CONTACT INFORMATION

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### *DPD Criteria*

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*The proponent's name and contact information and the name and contact information of their primary representative for the purpose of the description of the project.*

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Name of the Project:	ATCO Salt Cavern Storage Expansion Project
Name of Proponent:	ATCO Energy Solutions Ltd.
Address of Proponent:	5302 Forand St. SW Calgary, AB T3E 8B4
Senior Vice President & General Manager:	Mike Shaw
Principal Contact Person:	Jennifer Rumas Manager, Commercial Regulatory & Government Relations <b>Phone:</b> 403-993-4259 <b>Email:</b> <a href="mailto:Jennifer.rumas@atco.com">Jennifer.rumas@atco.com</a> <b>Website:</b> <a href="https://www.atco.com">https://www.atco.com</a>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## PART B: PLANNING PHASE RESULTS

### 3. ENGAGEMENT WITH JURISDICTIONS OR AGENCIES

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#### *DPD Criteria*

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*A summary of the results of any engagement undertaken with any jurisdiction or other party, including a description of how the proponent intends to address the issues raised in the summary referred to in subsection 14(1) of the Act.*

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ATCO Energy Solutions and ATCO have a strong understanding of operating in the AIH and a long-term presence in the area. This understanding is based on existing operations, projects currently under construction, and projects in the planning, regulatory approval, and assessment phases. AES continues to work collaboratively with area stakeholders and the agencies which govern development and operation of energy infrastructure and facilities, as well as water infrastructure and low carbon fuel projects, within the AIH. AES will build on positive experience and established relationships in the area to progress the development of the proposed Project.

Engagement on the proposed Project commenced in the Spring of 2020. Due to restrictions surrounding the COVID-19 pandemic, engagement activities have been conducted remotely by video or teleconference, by email and by distributing information packages to stakeholders. Engagement will be ongoing throughout the life of the Project.

AES consulted IAAC in April 2020 to introduce the Project and determine the need for an IPD. The need was confirmed by IAAC in May 2020. AES met with IAAC several times over 2020 to discuss Project planning and the proposed approach to the Initial Planning Phase as required by the Impact Assessment Act. AES has continued to meet with IAAC through 2021. Engagement with IAAC will continue via email and teleconference meetings throughout the Planning Phase of the proposed Project.

The Project was also introduced in a teleconference meeting with Strathcona County officials on March 27, 2020. AES provided information on the proposed Project scope and schedule and sought confirmation regarding the regulatory processes and requirements applicable to the Project. Formal discussions continued in February 2021 and further engagement is planned as the Project enters detailed design and construction.

AES has also consulted the Environmental Assessments Branch of Alberta Environment and Parks (AEP). A letter to confirm that an Environmental Impact Assessment (EIA) was not required by AEP was submitted on December 1, 2020. A letter from AEP confirming that, pursuant to Section 44 of the Environmental Protection and Enhancement Act (EPEA), an EIA was not required for the project was received on December 21, 2020. While an EIA is not required, additional regulatory requirements under EPEA apply to the project and are discussed specifically in Section 18 of this DPD and generally throughout this DPD and the SA provided in Appendix B. AES' existing EPEA Approval, which will apply to amend for the proposed Project, is also provided in Appendix D to demonstrate the types of conditions and monitoring that will be required for the Project.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

The Alberta Energy Regulator (AER) is the primary regulator of the subsurface and surface components of the Project, including in relation to environmental effects. The AER is responsible for ensuring efficient, safe, orderly and environmentally responsible development of energy resource activities, including regulating development and operation, asset integrity, monitoring, reporting and compliance, decommissioning, closure, and reclamation. There are at least 12 cavern storage projects operating in Alberta under the jurisdiction of the AER, including AES' existing Strathcona Salt Cavern Storage Facility. The effects from such projects, both surface and subsurface, as well as effective mitigation measures, are well understood by proponents and regulators in Alberta. AER approvals are discussed further in section 18.

Engagement with the AER was initiated in February 2021, and to date has consisted of discussions to determine the regulatory requirements for certain potential project alternatives for brine storage. Engagement with the AER will continue throughout the approval phase and up to completion of construction, and then continue throughout the operations phase as approval conditions are maintained and reporting requirements are met. The regulator responsible at the time of decommissioning (currently the AER) will also be engaged once decommissioning activities commence.

Initial engagement with remaining area stakeholders began at the end of Q4 2020. Jurisdictions, agencies, and non-Indigenous stakeholders that have been engaged or consulted during the Initial Planning Phase are shown in Table 1. This includes various government agencies, regional associations and local landowners and residents. Engagement with Indigenous groups is discussed in Section 4.

*Table 1: Jurisdictions, Agencies and Non-Indigenous Stakeholders Engaged by AES during the Initial Planning Phase*

<b>Federal Government</b>	Impact Assessment Agency of Canada Fisheries and Oceans Canada Environment and Climate Change Canada
<b>Provincial Government</b>	Alberta Energy Regulator Alberta Environment and Parks
<b>Municipal Government</b>	Strathcona County Beaver County Lamont County City of Edmonton
<b>Local Landowners, Occupants and Residents</b>	24 Landowners, occupants and residents within 1.5 km radius of the Project site at SW 34-55-21-W4M, Lot 'D' NW 34-55-21-W4M, and NW 27-55-21-W4M
<b>Mineral Rights Holders</b>	48 mineral rights holders within a 1.5 km radius of the Project site at SW 34-55-21-W4M and NW 27-55-21-W4M
<b>Regional Associations</b>	Alberta Industrial Heartland Association (AIHA)

Engagement and consultation activities will continue throughout the application and approval phases of the Project in accordance with applicable regulatory requirements and at the request of interested stakeholders to respond to any arising concerns or requests for information, and to assist in the preparation of regulatory applications. AES will also periodically reach out to local landowners, occupants, residents, and other interested stakeholders, to ensure their continued engagement throughout the construction and operations phases of the project. AES will engage the AER, AEP, and Strathcona County as required to support permitting requirements of the various components of the Project and in alignment with the schedule provided in Section 11. AES will continue to engage with these and any other applicable regulators throughout the operation of the facility.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Prior to submission of provincial regulatory applications for the various project components, AES will also further engage local landowners, occupants and residents within a 1.6 km radius of the Project, as well as other interested stakeholders, and will meet applicable AER Participant Involvement Program requirements. Formal participant involvement activities are anticipated to continue in spring of 2021 and then throughout the approval, development and construction phases as per the Project schedule provided in Section 11 and as per applicable energy development regulation requirements. Continued engagement or consultation with interested stakeholders is expected to occur through teleconference, telephone or email. It is expected that in-person engagement and consultation will continue to be limited due to the COVID-19 pandemic. However, once COVID-19 restrictions are lifted throughout the province, AES will begin to engage with stakeholders through in-person engagement, including providing site visits to interested parties, as desired.

No issues were directly raised with AES during engagement with jurisdictions, agencies or area stakeholders (Refer to Section 4 for engagement with Indigenous Groups). Additional information regarding the Project was requested by one nearby industrial stakeholder after receipt of the Project Information Package. Nine individual stakeholders attended the IAAC-led Virtual Engagement Session held on February 8, 2021, seven of which were members or representatives of First Nations or Métis organizations and one of which was known to be a member of an industrial association associated with the AIH.

Four members of the public and six federal agencies submitted formal comments or concerns on the Project via the IAAC-led engagement on the IPD. The federal agencies that submitted formal comments were: Employment & Social Development Canada, Environment and Climate Change Canada (ECCC), Fisheries and Oceans Canada (DFO), Health Canada, Indigenous Services Canada, Natural Resources Canada, and Women and Gender Equality Canada. The comments or concerns were summarized by IAAC and issued to AES as part of the Summary of Issues document. Responses on how AES has addressed or intends to address these issues are provided throughout this DPD and as part of the SA provided in Appendix B, as indicated in Appendix A.

AES is committed to working with all stakeholders throughout all phases of the proposed Project to ensure any issues are addressed and concerns are appropriately mitigated. This will also support the identification of different needs and ensure transparency and inclusivity, including the removal of barriers to participation for under-represented groups over the life of the Project. AES has developed positive relationships with local stakeholders since developing its initial Strathcona Salt Cavern Storage Project and will work with stakeholders throughout the design, construction, operating and decommissioning phases of the Project, including communicating changes or updates to the Project through its development.



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 4. ENGAGEMENT WITH INDIGENOUS GROUPS

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### *DPD Criteria*

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*A summary of the results of any engagement undertaken with the Indigenous peoples of Canada, including (a) a list of the Indigenous groups that may be affected by the project, including those groups that identified themselves during the planning phase as potentially being affected; and (b) a description of how the proponent intends to address the issues raised in the summary referred to in subsection 14(1) of the Act, including any potential adverse impact that the project may have on the rights of the Indigenous peoples of Canada recognized and affirmed by section 35 of the Constitution Act, 1982.*

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Building respectful and mutually beneficial relationships with Indigenous Communities groups, their Peoples and their businesses has long defined how AES does business. The foundation of those relationships is respect, transparency, and trust. Together with its Indigenous partners, AES is continually exploring new ways to collaborate.

AES believes in the importance of reconciliation and conducts and develops relationships with the principle for free, prior and informed consent in mind, and in the spirit of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and Canada’s Truth and Reconciliation Commission’s Calls to Action. AES’ Indigenous strategy is captured by four Es: Engagement, Economic participation, Education and Employment. These commitments and ATCO’s metrics which measure its success are clear in ATCO’s Annual Sustainability Reports which also include how these values and commitments are demonstrated. Information on AES’ efforts, programs and success regarding Indigenous employment, education and economic participation are discussed in Section 22.

The AIH is located to the northeast of Fort Saskatchewan, Alberta and adjacent to the North Saskatchewan River. The North Saskatchewan River derives its name from the Cree *kisiskâciwanisîpiy*, meaning “swift-flowing river” (Caron 2018). The river was first explored by Europeans in the 1690s by Hudson’s Bay Company fur trader Henry Kelsey. Subsequent traders engaged Cree guides to pursue further trade opportunities with the largely Cree Indigenous communities who fished in the *kisiskâciwanisîpiy*, hunted bison, woodland caribou, moose, and smaller mammals in the plains, and foraged for roots and berries in the river valley (Caron 2018). The *kisiskâciwanisîpiy* has been an important waterway for Indigenous Groups since before contact with European explorers.

The Project lands are privately owned by AES and no traditional uses of the Project site by Indigenous groups or peoples have been identified in previous regional studies for the area (Stantec 2010; Stantec 2013). Notwithstanding, Indigenous Communities were identified as those communities who had historically used the area in and around the proposed Project for traditional uses including hunting, fishing, plant gathering, and spiritual use. Some Indigenous Communities engaged as part of Project planning and engagement noted that acknowledgement of the Indigenous language names such as *kisiskâciwanisîpiy* were a means of cultural education and facilitation. Use of these names, or acknowledgement of the origin of Indigenous language place names in current use (e.g., Astotin Creek is named after *Astotin*, the Cree word for “hat”) helps to facilitate cultural knowledge transfer and a historical connection with the land

AES, in conjunction with IAAC, identified 33 First Nations, Métis Settlements, and Métis Regions (Indigenous Communities) that were engaged prior to the IAAC-led engagement period. Two additional Indigenous Communities were subsequently engaged.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

The following timeline generally summarizes AES-led engagement to-date with Indigenous Communities.

- AES initiated engagement with each of the initial 33 Indigenous Communities at the beginning of December 2020 with the distribution of a Project Information Package on the proposed Project. The package included information regarding the scope of the proposed Project, its location, schedule, contact information, and information specific to AES' existing presence and operations in the area.
- Following the initiation of the IAAC-led stakeholder engagement process on January 25, 2021, AES sent follow up emails to the 24 Indigenous Communities formally engaged by IAAC to advise them that the IPD had been posted to the IAAC website and that comments could be submitted through the IAAC-led engagement process or directly to AES.
- Based on responses and interest of Indigenous Communities engaged, AES had two-way discussions with a total of seven Indigenous Communities to discuss general comments, questions, concerns or requests for more information. These discussions occurred prior to and during the IAAC-led engagement period, which ended February 16, 2021.
- Following receipt of the IAAC Summary of Issues, AES formally reached out to the seven Indigenous Communities who submitted formal comments to discuss their concerns, address any questions and support determining how AES could mitigate or address their comments. This included one First Nation (Kelly Lake First Nation) who had not yet been engaged through the IAAC or AES led engagement processes but who submitted formal comments through the IAAC led stakeholder engagement process. This also included initial dialogue with Kikino Métis Settlement and Métis Nation of Alberta Region 2, increasing the number of Indigenous Communities engaged to ten.
- In late March, one First Nation (Sucker Creek First Nation) contacted AES directly to provide a Letter of Support for the Project and to discuss potential procurement opportunities in partnership with the First Nation's joint-venture partner. This First Nation was not engaged by AES or IAAC prior to or during the IAAC engagement process and did not submit comments through the IAAC-led engagement process. This increased the total number Indigenous Communities engaged to eleven.

During engagement, seven Indigenous Communities expressed interest in providing services to the Project. AES discussed potential opportunities and provided information on its procurement process and how to disseminate job and procurement information within communities.

Indigenous Communities included to-date in AES' engagement activities are listed in Table 2. Engagement to-date has been community-specific and includes distribution of initial Project Information Packages, formal notification by IAAC about the Project during their IAAC-led engagement process, follow up emails after the IPD was posted to the IAAC registry and the comment period officially began, submissions of formal comments to IAAC through the IAAC-led engagement, and two-way discussions between AES and the Indigenous Community both before or after the closure of the public comment period on February 16, 2021. No in-person engagement has taken place to-date due to concerns and restrictions arising from the COVID-19 pandemic.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 2 also includes the proximity of these Indigenous Communities' bands offices, reserve lands, or mailboxes to the proposed Project. AES acknowledges that these Indigenous Communities may have historic reserves, camp sites, and other connections to lands in closer proximity to the Project including historical use of the lands for traditional purposes.

Table 2: Indigenous Groups Engaged during the Initial Planning Phase and their Proximity to the Proposed Project

Indigenous Community	Distance from Project	Engagement To-Date					
		Received PIP <sup>1</sup>	IAAC-led engagement <sup>2</sup>	IPD follow up <sup>3</sup>	Submitted comments <sup>4</sup>	Engagement before Feb 16 <sup>5</sup>	Engagement after Feb 16 <sup>6</sup>
<b>Treaty 6</b>							
Alexander First Nation	NW 51 km	X	X		X	X	X
Alexis First Nation	W 90 km	X					
Beaver Lake Cree Nation	NE 120 km	X	X				
Enoch Cree Nation #440	SW 60 km	X	X	X		X	
Ermineskin Cree Nation	S 120 km	X	X	X			
Kehewin Cree Nation	E 150 km	X	X			X	
Louis Bull Tribe	S 110 km	X	X				
Montana First Nation	S 125 km	X	X	X		X	
O'Chiese First Nation	SW 185 km	X					
Paul First Nation	W 90 km	X	X	X			
Sunchild First Nation	SW 200 km	X					
Saddle Lake Cree Nation	NE 91 km	X	X	X			
Samson Cree Nation	S 115 km	X	X	X		X	
Whitefish Lake First Nation #128	NW 270 km	X	X				
<b>Treaty 7</b>							
Bearspaw First Nation (Stoney Nakoda Nations)	SW 315 km	X	X				
Blood Tribe	S 480 km	X					
Chiniki First Nation (Stoney Nakoda Nations)	SW 315 km	X	X				
Piikani Nation	SW 485 km	X	X				
Siksika Nation	S 335 km	X	X				
Stoney Nakoda Nations	SW 325 km	X		X		X	X
Tsuut'ina Nation	SW 335 km	X					
Wesley First Nation (Stoney Nakoda Nations)	SW 315 km	X	X				
<b>Treaty 8</b>							
Chipewyan Prairie Dene Nation	NE 120 km	X				X	
Sucker Creek First Nation	NW 260 km						X

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 2: Indigenous Groups Engaged during the Initial Planning Phase and their Proximity to the Proposed Project

Indigenous Community	Distance from Project	Engagement To-Date					
		Received PIP <sup>1</sup>	IAAC-led engagement <sup>2</sup>	IPD follow up <sup>3</sup>	Submitted comments <sup>4</sup>	Engagement before Feb 16 <sup>5</sup>	Engagement after Feb 16 <sup>6</sup>
<b>Alberta Métis</b>							
Métis Nation of Alberta – Region 4	SW 39 km	X	X				
Lac St. Anne Métis (Gunn Métis Local 55)	SW 70 km	X	X	X	X		
Buffalo Lake Métis Settlement	N 90 km	X	X				
Kikino Métis Settlement	NE 90 km	X	X		X		X
Elizabeth Métis Settlement	NE 195 km	X	X				
Fishing Lake Métis Settlement	E 180 km	X					
Métis Nation of Alberta – Region 2	NE 160 km	X			X		X
<b>Non-Treaty Nations</b>							
Descendants of Michel First Nation	NE 200 km	X	X		X		
Friends of Michel First Nation Society (Michael First Nation)	NE 200 km	X	X	X	X		
Foothills Ojibway First Nation	W 300 km	X	X				
Kelly Lake First Nation	NW 475 km				X		X

<sup>1</sup>AES sent the Project Information Package to these Indigenous Communities via email or letter mail.

<sup>2</sup>These communities were contacted by IAAC as part of the IAAC-led engagement. This does not include Indigenous Communities who were not engaged and chose to submit their own comments to IAAC on the Project.

<sup>3</sup>AES reached out to these communities via email to advise them that the IPD was available on the IAAC website for review or to follow up on submission of their comments on the IPD.

<sup>4</sup>These Indigenous Communities submitted formal comments to IAAC during the IAAC-led engagement period.

<sup>4</sup>These Indigenous Communities engaged in email exchanges, phone calls or meetings with AES prior to the end of the IAAC-led engagement period.

<sup>5</sup>These Indigenous Communities engaged in phone calls or meetings with AES after the end of the IAAC-led engagement period.

Members of six Indigenous Communities participated in the IAAC-led Virtual Engagement Session held on February 8, 2021 conducted by IAAC, including Kelly Lake First Nation who was not originally engaged by AES or IAAC. Seven Indigenous Communities formally submitted letters of comment to IAAC during the IAAC-led public and stakeholder engagement process. These communities were Alexander First Nation, Descendants of Michel First Nation Association, Gunn Métis Local #55 (Lac Ste. Anne Métis), Kelly Lake First Nation, Kikino Métis Settlement, Métis Nation of Alberta Region 2, and Michel First Nation.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Following receipt of the IAAC Summary of Issues in early March 2021, AES contacted each of these Indigenous Communities to discuss their comments and concerns and learn more about how AES could address them. Of these seven Indigenous Communities who provided formal feedback to IAAC, discussions have been held to date with four communities to discuss their comments and potential mitigation measures to address their concerns. Any commitments from AES arising out of these discussions are reflected in the appropriate sections of this DPD, as described below or as identified in Appendix A. Continued engagement with the remaining three Indigenous Communities who submitted comments via the IAAC process and any other Indigenous Communities who did not submit comments will continue at their interest.

To date, a total of eleven Indigenous Communities have engaged directly with AES through teleconference calls, email exchanges, and requests for additional Project information. Additional information has been provided through conversation as well as through email and delivery of Project-specific graphics and shapefiles. The Indigenous Communities with which AES has directly engaged to date are: Alexander First Nation, Chipewyan Prairie Dene First Nation, Ermineskin First Nation, Kehewin Cree First Nation, Kikino Métis Settlement, Kelly Lake First Nation, Métis Nation of Alberta Region 2, Montana First Nation, Samson Cree Nation, Stoney Nakoda Nations, and Sucker Creek First Nation.

AES discussed a variety of items with these eleven Indigenous Communities noted above. Areas of interest to Indigenous Communities and concerns discussed during AES-led engagement are provided below, including where these items are addressed or otherwise discussed within the DPD. In some instances, Indigenous Communities engaged did not have any formal concerns and were seeking to understand more about the Project or how they could be involved. A number of the items listed below are similar to those issues identified in the IAAC Summary of Issues. These items are listed because they were discussed with Indigenous Communities that did not submit any formal comments to IAAC.

- Understanding how caverns work (Section 9.5)
- Depth of the caverns in relation to groundwater (Section 9, Figure 6)
- Applicability of newly issued provincial water management plans on the Project (upon review, these plans were not applicable and were specific to upstream oil and gas production)
- Use of fresh water during Project construction and operation (Section 9.1, Section 9.4.1, Section 13; Appendix B Table 8)
- Potential impacts to tributaries of the North Saskatchewan River (Section 14, Section 19, Section 21; Appendix B Table 8)
- Importance of water to the Métis experience (Section 14, Section 19, Section 21; Appendix B Table 8)
- Environmental fate of water and brine used for the Project (Section 9.1, Section 9.4.1; Appendix B Table 10)
- Cumulative development in the AIH (AES has provided rationale for the Project selection in Section 12. However, ongoing development in the AIH is not within the care and control of AES.)
- Project location relative to Traditional Use Lands (Section 13, Section 21, Section 22; Appendix B Table 17)

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

- Potential for the Project to have downstream effects to Traditional Land Users by creating a larger avoidance zone and putting more pressure on existing Traditional Use areas (Section 21; Appendix B Table 17)
- Ground truthing of traditional and cultural use sites (Section 21; Appendix B Table 17)
- Potential effects to cultural or heritage resources (Section 4, Section 18, Section 21; Appendix B Table 17)
- Involvement in discovery of cultural or heritage resources (Section 4, Section 18, Section 21; Appendix B Table 17)
- Capacity for cultural education (Section 4, Section 15, Section 21)
- Potential procurement or employment opportunities (Section 15, Section 22; Appendix B Table 17)
- Site visits (Site visits will be coordinated with Indigenous communities as part of ongoing Project engagement and following the lessening of COVID-19 restrictions)
- Land use after reclamation (Section 9.4.3)
- Loss of cultural traditions and language through employment or activity in the traditional western economy (Section 22; Appendix B Table 17)

Comments and concerns provided directly to IAAC through the IAAC-led engagement process and provided to AES in the IAAC Summary of Issues are identified in Appendix A. Appendix A includes reference to where in the DPD or it's Appendices AES has provided responses to these issues and how AES plans to address or mitigate them.

A Pre-Consultation Assessment Request will be submitted to the Alberta Aboriginal Consultation Office (ACO) for their consultation intensity recommendation for the Project. Once a response is provided, AES will follow the recommendation of the Government of Alberta. AES does not anticipate that consultation with First Nations or Métis Settlements will be required by the ACO due to the land ownership, location and nature of the proposed Project. AES will continue engagement activities with Indigenous Communities outside of the ACO framework throughout development and operation of the Project and is committed to working with these and any other Indigenous Communities as appropriate to address their interests and concerns. AES will follow the consultation and engagement protocols of interested Indigenous Communities throughout the lifecycle of the Project.

In the short-term, AES will continue to engage with all interested Indigenous Communities throughout 2021. Engagement activities will vary depending on the nature and extent of impacts on communities, and how each Indigenous Community wants to be engaged. Following recovery from the COVID-19 pandemic, or earlier if provincial restrictions are lifted, AES will begin to engage with Indigenous Communities through in-person engagement, including providing site visits to those Indigenous Communities who are interested. AES is currently looking at alternatives to site visits (such as virtual tours) to protect the health and safety of AES workers and Indigenous Communities while COVID-19 remains a risk. Engagement in 2021 will continue to be conducted through teleconference, telephone, video meetings, and email or mailed information requests as much as practicable.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

AES (through ATCO) has an established Consultation Fee Schedule that is used to allocate consistent and fair Project or Activity Fees to Indigenous Communities engaged by AES. As part of AES' direct engagement with Indigenous Communities, AES has offered compensation in accordance with the Consultation Fee Schedule to facilitate engagement activities through the payment of Submission Fees or Administration Fees. Indigenous Communities were also eligible to apply for funding provided from IAAC to assist the communities with their participation in the IAAC process for the Project.

AES is committed to long-term and mutually beneficial relationships with Indigenous Communities. As part of Project planning, construction, and operation, AES will continue to engage with Indigenous Communities and provide updates on Project activities and potential opportunities for economic or educational participation. This approach will be refined on a Community-specific basis to ensure that updates and opportunities are provided in accordance with each Indigenous Community's consultation and engagement protocol. AES will endeavour to work with Indigenous Communities in accordance with their specific consultation and engagement protocols to better understand how vulnerable or underrepresented segments of the communities can be involved in engagement and Project activities, including potentially employment opportunities. This will also support the identification of different needs and ensure transparency and inclusivity, including the removal of barriers to participation for under-represented groups over the life of the Project.

AES is also committed to ensuring that interested Indigenous Communities are informed of incidental discoveries of any archaeological or cultural heritage resources as a result of Project activities. AES is committed to open and honest engagement with Indigenous Communities on the potential effects of the Project, including providing opportunities to review environmental mitigation measures (e.g., Environmental Protection Plans, Discovery of Heritage and Archaeological Resources Contingency Plans), opportunities for economic involvement, and engagement on decommissioning, remediation and reclamation of the Project. In the event that AES plans to trench a pipeline crossing of a wetland or water body, AES is open to engaging with interested Indigenous Communities to discuss mitigation measures prior to submitting the *Code of Practice for Pipelines and Telecommunications Lines Crossing a Water Body* (GoA 2013) Notification to AER.

AES and ATCO have genuine relationships with many Indigenous Communities, where we listen and learn to truly understand their unique perspectives. Engagement with Indigenous groups includes discussions about projects that may impact them, exploring how we can best meet their energy needs and developing unique approaches to partnership and collaboration. We believe in listening and understanding the needs and concerns of communities and addressing conflict through collaborative discussions around mitigating impacts. We strive to understand all viewpoints and tailor solutions to the specific needs and traditions of each community. With existing infrastructure spanning thousands of kilometres, it is vital that ATCO engages with Indigenous Communities in the areas where it operates (ATCO 2020). Our engagement strategy also includes 12 relationship agreements that formalize long-term strategic commitments with communities. These agreements require regular strategic discussions with Indigenous groups about how we can work together, now and in the future, and have become the foundation for project specific memorandums of understanding (MOUs) and joint venture (JV) partnerships. (ATCO 2021).

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 5. REGIONAL ASSESSMENTS AND RELEVANT ENVIRONMENTAL STUDIES

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### *DPD Criteria*

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*Any study or plan, relevant to the project, that is being or has been conducted in respect of the region where the project is to be carried out, including a regional assessment that is being or has been carried out under section 92 or 93 of the Act or by any jurisdiction, including by or on behalf of an Indigenous governing body, if the study or plan is available to the public.*

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The proposed Project is located approximately 14 kilometres northeast of Fort Saskatchewan and approximately 30 kilometres northeast of Edmonton, in the AIH. No regional assessments as defined in Sections 92 and 93 of the *Impact Assessment Act* have taken place in the Alberta Industrial Heartland.

Land use in the AIH is addressed by each municipality through an Area Structure Plan Bylaw which consolidates and conforms with established planning policies, regulations, objectives, and requirements of Strathcona County and considers the characteristics and opportunities contained within the plan area (Strathcona County 2018c). The Project site is located entirely within the Strathcona Heavy Industrial Policy Area as per the Alberta Industrial Heartland Area Structure Plan Bylaw (Strathcona County 2020b) and is zoned as “Heavy Industrial (Heartland)” as specified by Strathcona County. The Alberta Industrial Heartland Area Structure Plan Bylaw (Strathcona County 2020b) establishes objectives for development of Heavy Industrial Projects within Strathcona County’s portion of the AIH to ensure that:

- Risks associated with industrial development are responsibly managed.
- Efficient design of industrial developments is promoted.
- Long term viability of economic growth and environmental protection in the region is considered. (Strathcona County 2020b).

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 2020b). The Municipal Development Plan includes specific policies that deal with development near the North Saskatchewan River and the conservation and quality of water, land, air, and natural resources within Strathcona County. The Alberta Industrial Heartland Area Structure Plan Bylaw is a component of the overall Strathcona County Municipal Development Plan (Strathcona County 2020b). AES has met with Strathcona County to discuss the Project and will adhere to the relevant requirements of these plans through Project planning into construction and operation of the Project.

The proposed Project will be located in the Fort Air Partnership (FAP) airshed, which extends from Elk Island National Park at the southern boundary of the airshed to the village of Newbrook, approximately 80 km north of the Project site. The airshed includes the communities of Fort Saskatchewan, Gibbons, Bon Accord, Bruderheim, Lamont, Redwater, Waskatenau and Thorhild, as well as Elk Island National Park. The FAP does not extend to the City of Edmonton, which is located to the southwest of the FAP Boundary. The FAP monitors and collects air quality using ten (10) continuous monitoring stations and forty-seven (47) passive monitors. The data is compared to provincial Ambient Air Quality Objectives and used to inform policy and management decisions by government and other organizations (FAP 2020). FAP data was reviewed and considered when characterizing air quality in the region and is discussed in Section 14, Section 24, and Section 4 of Appendix B.



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Under the Alberta Land Stewardship Act, the North Saskatchewan Regional Advisory Council is developing a regional management plan for the region of the North Saskatchewan River watershed where the Project is located (NSRAC 2015). The North Saskatchewan Region has approximately 85,780 km<sup>2</sup> (approximately 13%) of Alberta's total land base (AEP 2020). 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. The Terms of Reference for Developing the North Saskatchewan Regional Plan notes that the two main drivers of land use in the North Saskatchewan Region are economic growth and population growth (GoA 2014b). The Terms of Reference for Developing the North Saskatchewan Regional Plan (GoA 2014b) present the goals and values that will be presented in the final plan, however the plan is not yet finalized.

Alberta Environment and Parks has developed several regional frameworks for this area as part of the Cumulative Effects Management Framework in Alberta, including the *Water Management Framework for the Industrial Heartland and Capital Region* which aims to minimize impacts to the North Saskatchewan River by improving water quality and ensuring that water conservation practices are in effect (AEP 2008). Additionally, the Project falls within the boundaries of the *Capital Region Air Quality Management Framework* which manages ambient air quality in the region through a multi-stakeholder approach (ESRD 2012). In addition, the Northeast Capital Industrial Association (NCIA) has developed a *Regional Noise Management Model* and *Regional Noise Management Plan* (NCIA 2020). The *Regional Noise Management Model* models noise at a regional level to address normal operating conditions, routine planned event strategies, and new facility standards (NCIA 2020). AES is not presently nor expected to be a major air or noise emission source in the region and while it is subject to the regulatory frameworks of these plans, it is not a participant.

The Project will be a very small contributor to air emissions within the local air shed (refer to Sections 6, 23 and 24). Presently, AES is not required to conduct ambient air quality monitoring under its existing EPEA Approval. Ambient air quality monitoring in the region is conducted and managed by the FAP. At present, AES is not an industry member of FAP and does not anticipate any Project-specific obligations for monitoring given its small contribution to emissions. In addition, AES will comply with the *Capital Region Air Quality Management Framework*. However, there are currently no Project-specific commitments associated with this framework, as it applies to NO<sub>2</sub>, SO<sub>2</sub>, fine particulate matter, and dust; emissions of which are expected to be minimal or not applicable in association with the proposed Project.

Several regional initiatives are also in development, which could be applicable to the Project. These include the *Air Management Framework for the Industrial Air Management Area* and the *NCIA Regional Groundwater Management Framework* that will be developed by the Government of Alberta as part of the North Saskatchewan Regional Plan planning process and directive.

AES will consider these regional initiatives and plans during Project planning, construction and operation. Any new regional initiatives that apply to the Project will be reviewed and operational adjustments will be made in accordance with the requirements of the initiative.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 6. STRATEGIC ASSESSMENTS

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### *DPD Criteria*

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*Any strategic assessment, relevant to the project, that is being or has been carried out under section 95 of the Act.*

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The AIH has not been the subject of a strategic assessment under section 95 of the *Impact Assessment Act*.

ATCO Energy Solutions reviewed the *Strategic Assessment of Climate Change (SACC)* (ECCC 2020b). The SACC was developed by ECCC.

An evaluation of GHG emissions associated with the proposed Project is provided in Section 23 of this DPD and has been calculated in accordance with the requirements of Sections 3 and 4 of the SACC. Overall, the GHG emissions associated with Project construction and operation are very low in magnitude when compared to provincial and national emission totals. As demonstrated in Section 23 and Appendix C, the only direct sources of on-site emissions are expected to be pilot and purge gas for the two flare stacks and fugitive emissions associated with piping and process equipment.

The proposed Project will not have upstream GHG emissions greater than or equal to the thresholds outlined in Table 1 of Section 3.2.2 of the SACC. These upstream GHG thresholds, which begin at 500 kt CO<sub>2</sub>e per year for 2020 to 2029 and end at 100 kt CO<sub>2</sub>e per year in 2050 and beyond, greatly exceed the estimated upstream emissions associated with the Project. The highest total annual upstream emissions expected in relation to the Project between 2024 and 2030 is 12.64 kt CO<sub>2</sub>e. Upstream emissions are not expected to increase post-2030 as the various federal and provincial emissions reductions requirements are expected to be further implemented.

Under the SACC, proponents are typically required to provide estimated GHG intensities. The SACC provides an emissions intensity calculation, which calculates emissions intensity by dividing the net GHG emissions by units produced. The SACC notes that the emissions intensity estimate may not be possible or relevant for some project types. The proposed Project is a storage project and will not be producing any units or products. AES confirmed with IAAC that the emissions intensity calculation does not apply to the proposed Project. As a result, emissions intensity has not been calculated.

The proposed Project has a lifespan of 25 years and is expected to be in operation from 2024 to 2049. As the proposed Project is expected to cease operations prior to 2050, a formal plan to achieve net-zero emissions by 2050 is not required in accordance with Sections 1.1, 4.2 and 5.3 of the SACC. However, AES will evaluate opportunities to reduce Project-related emissions throughout the operations phase and will ensure decommissioning activities meet net-zero requirements. Due to the low level of emissions expected from the proposed Project, it is anticipated that reductions in emissions could be achieved through the use of low carbon fuels as their supply is built out to markets. In particular, the majority of emissions associated with the facility would be from the electric drive motors and would be indirectly associated with the production of electricity in the province. One approach to achieving net-zero emissions would be to purchase green electricity to power the facility. Another approach would be to use low carbon fuels such as renewable natural gas to reduce or eliminate emissions from the flare stack pilots and purge gas, once these fuels are more available in the market.

It is anticipated that these options will be readily available post-2030 to support achieving these goals. Other options which may become commercially viable in the mid-term include the development of a site-specific, off-grid clean power source for the facility. AES will also evaluate the replacement of equipment, at the existing facility and associated with the expansion, with best available technologies, and the purchase of offset credits.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Decommissioning activities that would support net-zero include the use of low carbon electric or hydrogen vehicles and mobile equipment, which are anticipated to be readily available at the time of decommissioning and the use of best available technologies and environmental practices in 2049.

Salt caverns can also store a variety of products. While the proposed caverns would store NGLs for the Project's lifecycle, cavern storage will also be required to support the changing energy landscape. AES is committed to evaluating how these caverns could be repurposed to support the goal of net-zero by 2050 by storing products such as low-carbon hydrogen or other fuels which can be used to support an increased ability to rely on renewable electricity.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## PART C: PROJECT INFORMATION

### 7. PROJECT PURPOSE AND NEED

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#### *DPD Criteria*

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#### *A statement of the purpose of and need for the project, including any potential benefits.*

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The purpose of the Project is to expand the NGL storage capacity at AES' existing Strathcona Salt Cavern Storage Facility to serve additional customers in the AIH. No other products are expected to be stored in the caverns during the life of the Project. The NGL products stored in the caverns will be entirely owned and used by third parties. Cavern storage is a safe, efficient and effective way store NGLs, as discussed in Section 12.

Benefits associated with the Project include:

- an expansion of critical area services for energy storage which will help foster investment and associated positive economic impacts in the region;
- contributions to local, provincial and federal tax revenues;
- an increase in both direct and indirect employment in the region and communities surrounding the Project during the construction, operation and decommissioning phases of the Project, including generating an ongoing need for skilled labor and resources in areas such as welders, inspectors, electricians and skilled operations staff; and
- increased spend in local communities for contractors, products and services, including, where possible, products and services received from Indigenous-owned businesses.

Concerns have been raised with respect to the potential for NGL storage projects to result in increased upstream oil and gas activities. The correlation between NGL storage projects and upstream natural gas production is considered the reverse. Global and regional market demand factors, including the transition away from higher carbon intensive fuels like coal, is expected to result in increased natural gas production, which would necessitate NGL storage facilities to accommodate the predicted growth.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 8. PHYSICAL ACTIVITIES REGULATION

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### *DPD Criteria*

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*The provisions in the schedule to the Physical Activities Regulations describing the project, in whole or in part.*

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The proposed Project is subject to Section 38(f) of the Schedule of the *Physical Activities Regulation*:

*“38 The expansion of one of the following: (f) an existing natural gas liquids storage facility, if the expansion would result in an increase in storage capacity of 50% or more and a total storage capacity of 100 000 m<sup>3</sup> or more.”*

AES was required to submit an IPD for the proposed Project because the total NGL storage capacity at AES' existing Strathcona Salt Cavern Storage Facility is approximately 430,000 m<sup>3</sup> with an additional 100,000 m<sup>3</sup> under construction. The increase in storage capacity that would result from the proposed Project is approximately 400,000 m<sup>3</sup>, which represents an increase in the total volume of storage that is more than 50% and greater than 100,000 m<sup>3</sup>.

No other criteria presented in the Schedule to the *Physical Activities Regulation* are applicable to the proposed Project.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 9. PROJECT ACTIVITIES AND PHYSICAL WORKS

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### *DPD Criteria*

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*A description of all activities, infrastructure, permanent or temporary structures and physical works to be included in and associated with the construction, operation and decommissioning of the project, including their purpose, size and capacity.*

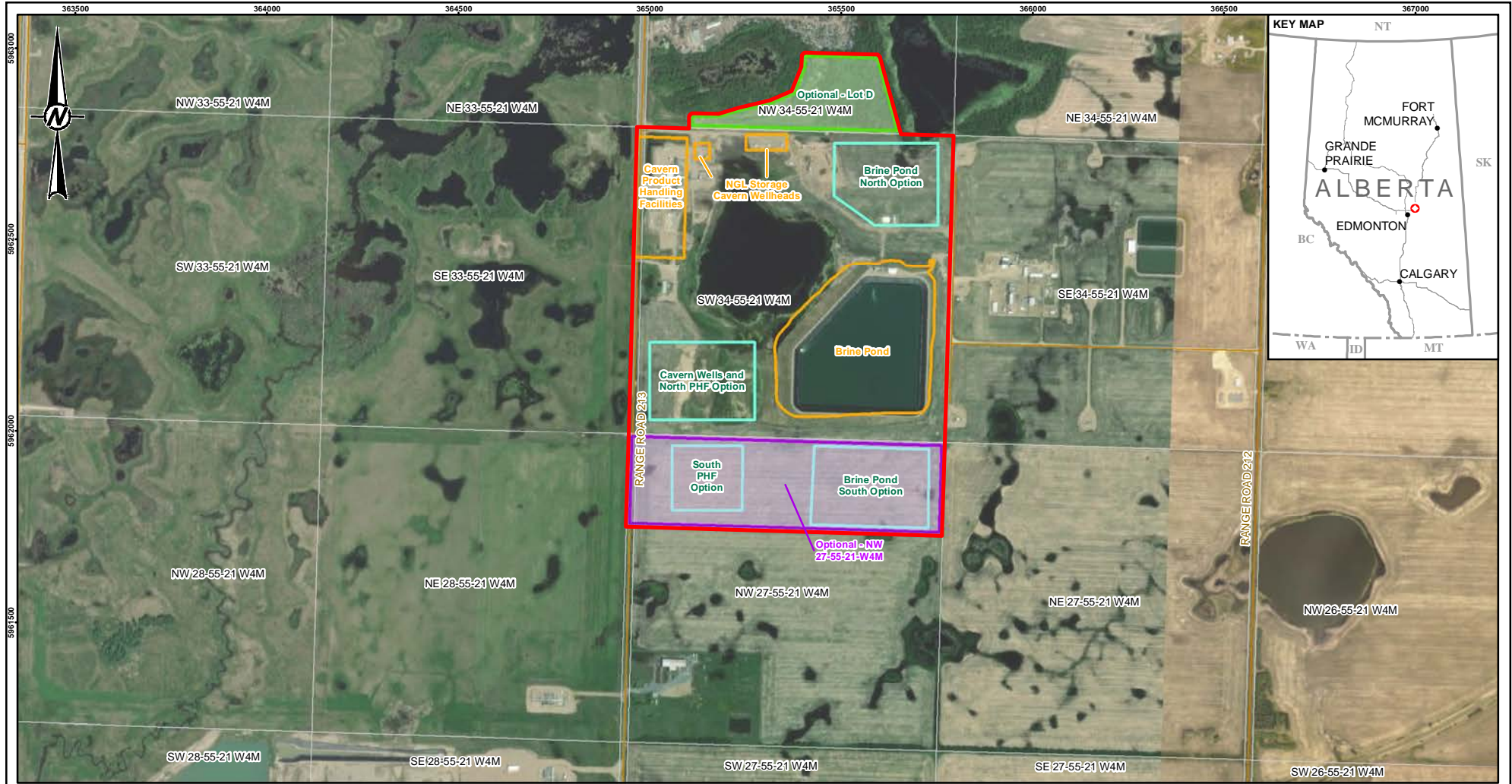
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The proposed Project will be an expansion of AES' existing Strathcona Salt Cavern Storage Facility. Existing infrastructure includes four NGL caverns, a product handling facility, a brine pond, and auxiliary buildings. These facilities have been in operation since 2016. A fifth cavern is currently under development and will be operational in 2022. All facilities and infrastructure related to the proposed expansion will be developed on land, and within mineral rights, owned or controlled by AES.

The proposed Project consists of the construction and operation of four new underground salt caverns and associated surface facilities and infrastructure. The facilities and infrastructure required for the Project are identified in Table 3. New facilities to be developed as part of the proposed Project are identified in Table 3, section A and described in Section 9.1. AES will also utilize existing infrastructure to support development of the proposed Project. This existing infrastructure is identified in Table 3, section B and described in Section 9.2. Information on third party infrastructure is provided in Table 3, section C and described in Section 9.3. Construction, operation and decommissioning activities are described in Section 9.4. Three of the four caverns are targeted for commercial operation in mid-2024. The fourth cavern is targeted for commercial operation in late 2024.

The existing Strathcona Salt Cavern Storage Facility and the proposed Project, including development areas currently under consideration and pending final design, are shown in Figure 2. The Project site, zoning, and nearby infrastructure are shown in Figure 3 (Note: the pipeline ROW is not shown due to commercial sensitivity; however the pipelines are included in discussions of the Project throughout the DPD). AES' mineral rights and surface holdings are shown in Figure 4.

The Project site, the spatial areas within the Project site, and the local and regional assessment areas associated with the SA (refer to Appendix B) are shown in Figure 5. For the purposes of the DPD, the Project Site includes areas under consideration and pending final design. The Project Site encompasses all of SW 34-55-21-W4M, the northernmost 20 hectares of NW 27-55-21-W4M, 5 hectares of Lot D within NW-34-55-21-W4M, and the centre line of the proposed pipeline ROW.



- PROJECT SITE
- OPTIONAL - LOT D
- OPTIONAL - NW 27-55-21 W4M
- SITE PLAN - EXISTING FACILITY
- SITE PLAN - NEW FACILITY
- LOCAL ROAD



CLIENT  
**ATCO ENERGY SOLUTIONS**

CONSULTANT



YYYY-MM-DD	2021-03-31
DESIGNED	SL
PREPARED	NF
REVIEWED	CES
APPROVED	DV

**REFERENCE(S)**

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PROJECTION: UTM ZONE 12 DATUM: NAD 83

**PROJECT**

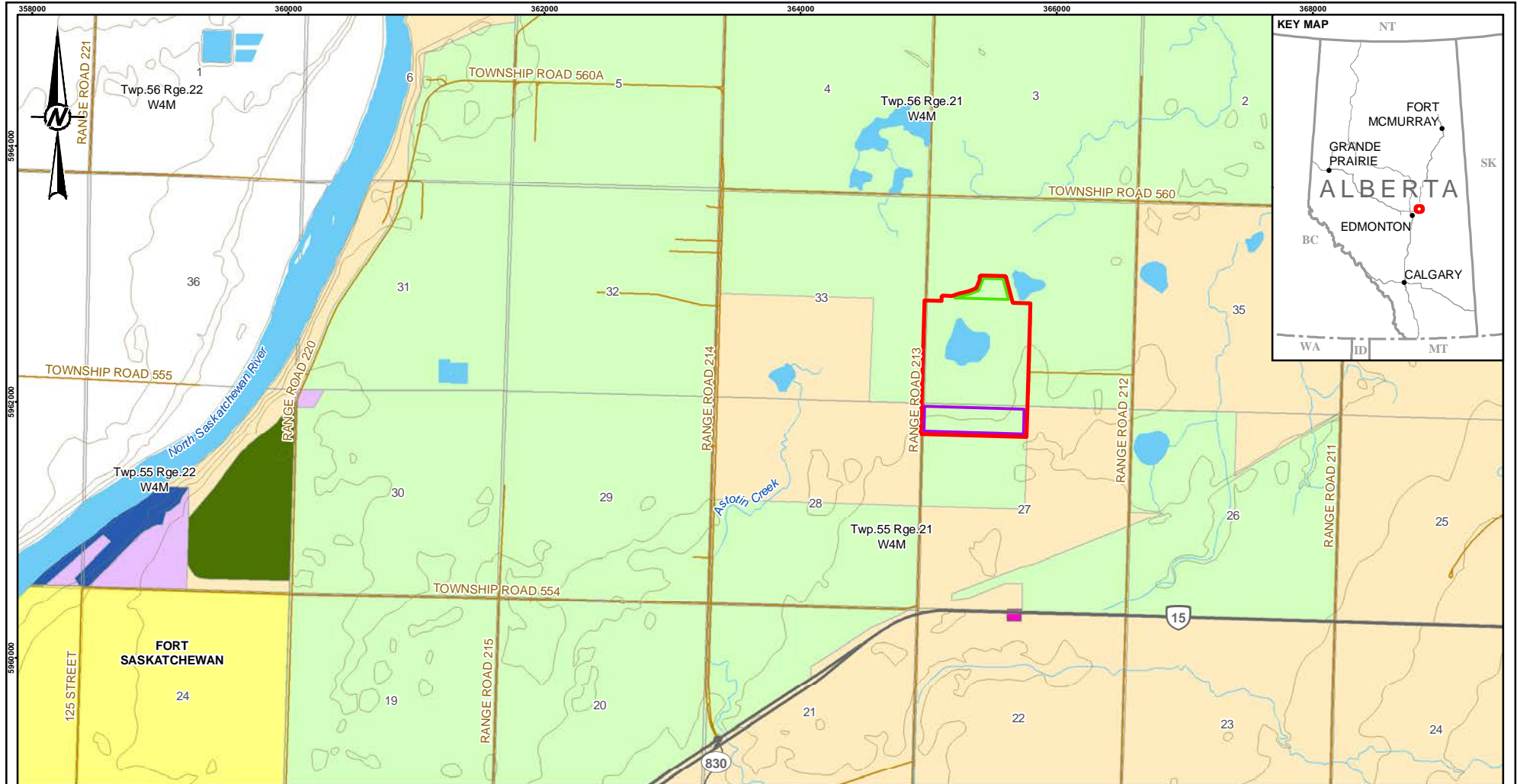
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**

**TITLE**

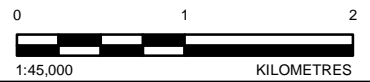
**SITE PLAN**

PROJECT NO.	CONTROL	REV.	FIGURE
123513692-0004		0	2

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM ANS/A



	PROJECT SITE		ELEVATION CONTOUR (10 m)
	OPTIONAL - LOT D		RAILROAD
	OPTIONAL - NW 27-55-21 W4M		WATERCOURSE
<b>LAND USE ZONING</b>			POPULATION CENTRE
	AGRICULTURE: GENERAL		WATERBODY
	CONSERVATION		
	HEAVY INDUSTRIAL		
	HEAVY INDUSTRIAL (HEARTLAND)		
	HIGHWAY COMMERCIAL		
	MEDIUM INDUSTRIAL (HEARTLAND)		



CLIENT  
**ATCO ENERGY SOLUTIONS**

CONSULTANT



YYYY-MM-DD	2021-03-31
DESIGNED	SL
PREPARED	NF
REVIEWED	CES
APPROVED	DV

**REFERENCE(S)**  
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PROJECTION: UTM ZONE 12 DATUM: NAD 83

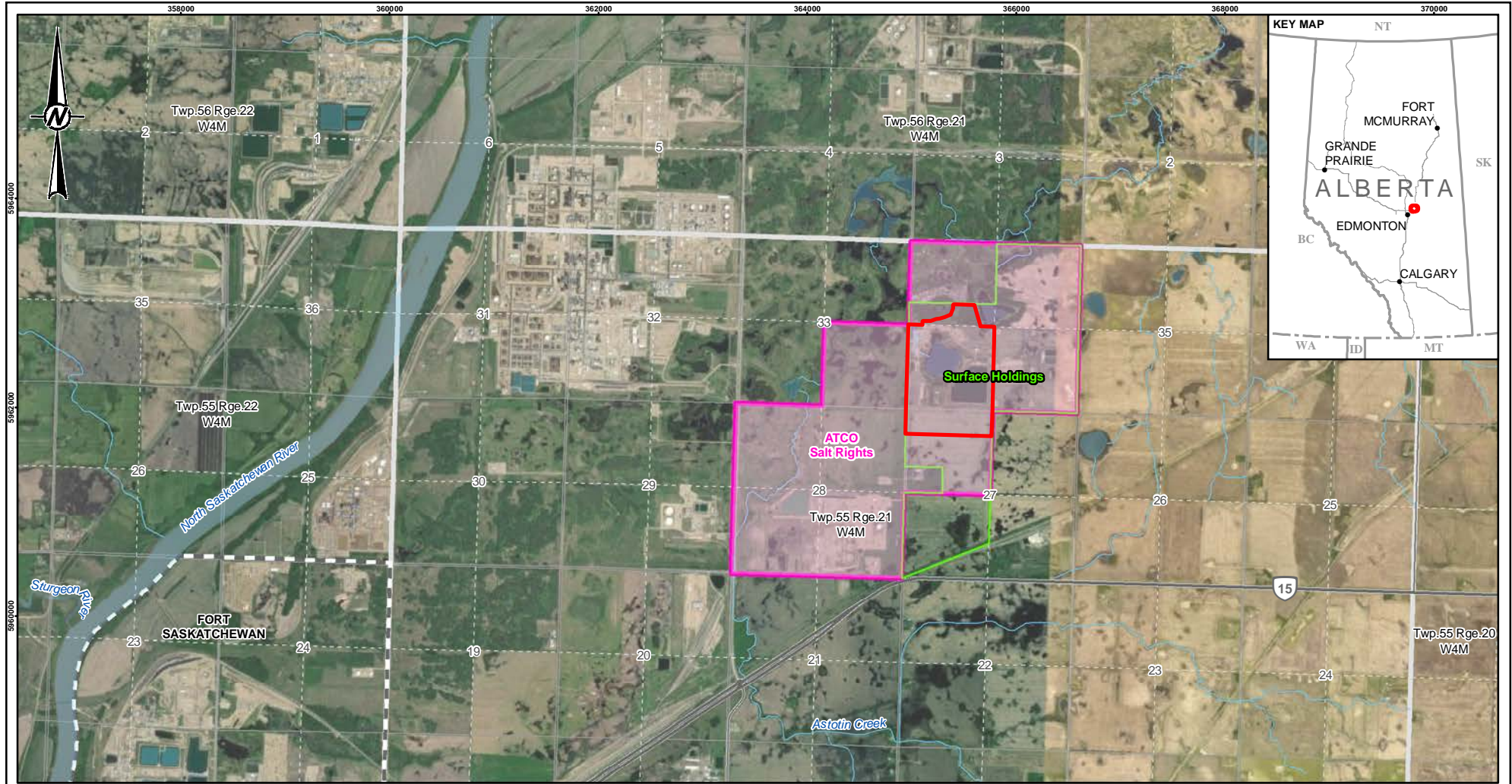
PROJECT  
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**

TITLE  
**PROJECT SITE**

PROJECT NO.	CONTROL	REV.	FIGURE
123513692-0006		0	3

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM ANS/A





- ATCO SALT RIGHTS
- ATCO SURFACE HOLDINGS
- PROJECT SITE (INCLUDING OPTIONS)
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- POPULATION CENTRE
- WATERBODY



CLIENT  
**ATCO ENERGY SOLUTIONS**

CONSULTANT



YYYY-MM-DD	2021-03-31
DESIGNED	SL
PREPARED	NF
REVIEWED	CES
APPROVED	DV

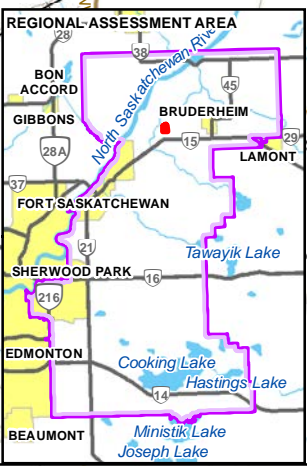
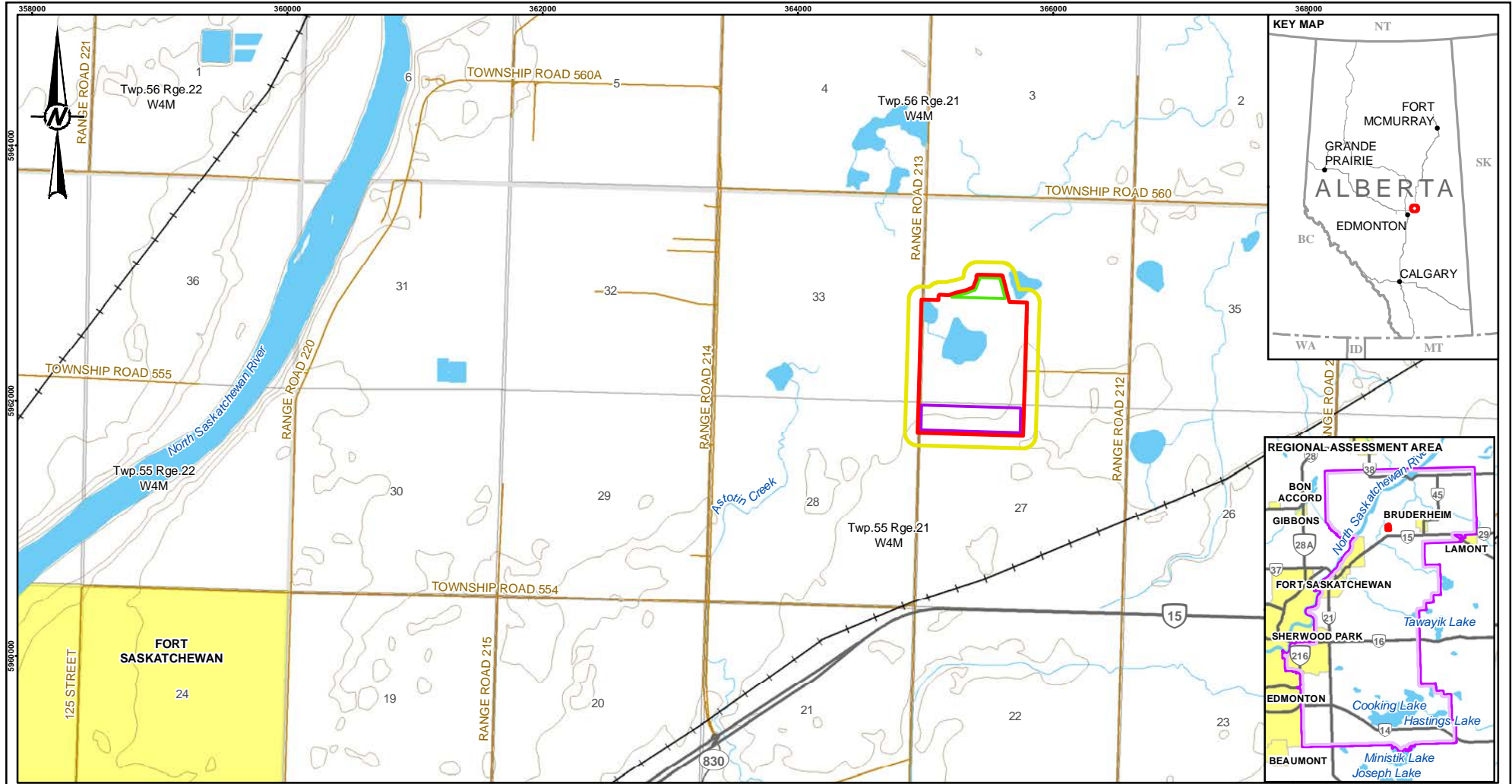
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PROJECT  
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**

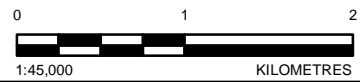
TITLE  
**LOCATION OF ATCO LANDS AND SALT RIGHTS**

PROJECT NO.	CONTROL	REV.	FIGURE
123513692-0008		0	4

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM ANS/A



- PROJECT SITE
- OPTIONAL - LOT D
- OPTIONAL - NW 27-55-21 W4M
- LOCAL ASSESSMENT AREA (100M)
- REGIONAL ASSESSMENT AREA
- ELEVATION CONTOUR (10 M)
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- LOCAL ROAD
- RAILROAD
- WATERCOURSE
- POPULATION CENTRE
- WATERBODY



CLIENT	ATCO ENERGY SOLUTIONS	
CONSULTANT	Stantec	
	YYYY-MM-DD	2021-03-31
	DESIGNED	SL
	PREPARED	NF
	REVIEWED	CES
	APPROVED	DV

**REFERENCE(S)**  
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 PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT  
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**  
 TITLE  
**PROJECT SITE, LOCAL AND REGIONAL ASSESSMENT AREAS AS PRESENTED IN THE SCREENING ASSESSMENT**

PROJECT NO. CONTROL REV. FIGURE  
 123513692-0010 0 5

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM ANS/A

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 3: Components of Proposed Development

Component	Description
<b>A. New AES Facilities</b>	
<b>Salt caverns and injection wells</b>	<p>Four wells</p> <p>Four underground caverns to be developed in the Lotsberg salt formation, approximately 1,800 m below surface</p> <p>Target cavern size – 120,000 m<sup>3</sup></p> <p>Working cavern storage capacity – approximately 100,000 m<sup>3</sup></p>
<b>Brine Storage</b>	<p>Brine pond</p> <ul style="list-style-type: none"> <li>Capacity - approximately 400,000 m<sup>3</sup></li> <li>Will consist of either a single or a double cell pond</li> </ul> <p>As described in Section 12, AES is also considering storage tanks as an alternative to a brine pond. If used, the following would apply:</p> <ul style="list-style-type: none"> <li>Capacity – approximately 300,000 m<sup>3</sup></li> <li>Approximately 6 above ground storage tanks, each with a capacity of 40,000 – 60,000 m<sup>3</sup></li> </ul>
<b>Brine pump house</b>	Piping, pumps, degasification facilities
<b>NGL product handling facilities</b>	Piping, pumps, separators, dehydration units
<b>Cavern washing pipelines</b>	Approximately 900 metres of water pipelines and approximately 900 metres of brine pipelines connecting the new cavern wells to existing AES cavern washing facilities and the new disposal well
<b>Brine disposal well</b>	One disposal well completed in the Nisku formation
<b>NGL pipelines</b>	<p>Two Class II pipelines, each less than 5 kilometres, connecting the Project site to customer meter stations</p> <p>Metering facilities to be located on the Project site</p>
<b>B. Existing AES Infrastructure</b>	
<b>Cavern washing pipelines</b>	Water and brine pipelines connecting the new cavern washing pipelines to existing AES cavern washing facilities
<b>Cavern washing facility</b>	Water pumps, tank, pumps, and piping for water and brine
<b>Brine disposal well</b>	One existing disposal well completed in the Nisku formation
<b>Water intake and pipeline system</b>	Water intake on the North Saskatchewan River, pumps, and pipeline system
<b>C. New Third-Party Infrastructure</b>	
<b>Utilities</b>	Natural gas and electric utility service extended to the Project expansion site by the local franchised utility operators

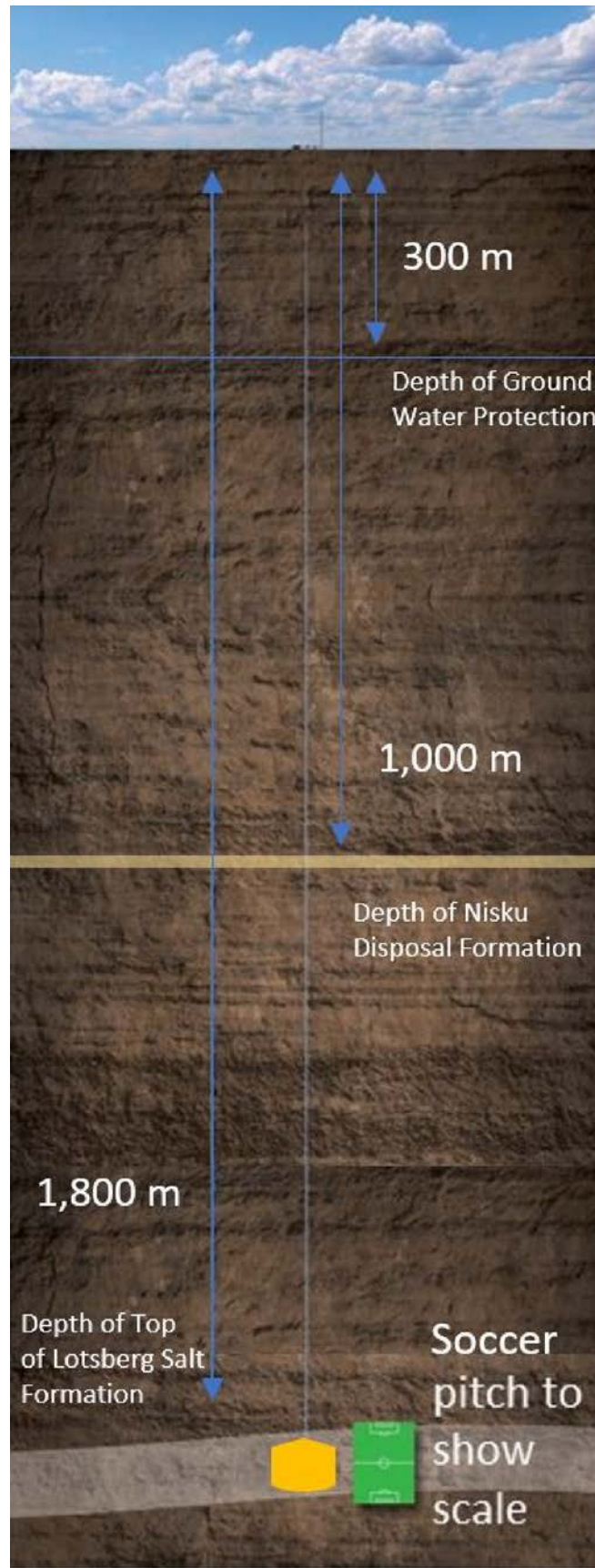
# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 9.1 New Infrastructure Associated with the Project

### Salt Caverns and Injection Wells

The proposed Project includes the development and operation of four underground salt caverns. The NGL products proposed to be stored in the caverns are propane, butane and condensate. The caverns will be developed in the Lotsberg formation, the top of which is located approximately 1,800 m below surface. Once developed, each cavern will have an approximate total volume of 120,000 m<sup>3</sup> and will have a working NGL product storage capacity of approximately 100,000 m<sup>3</sup>. Figure 6 shows a scale diagram of salt caverns, once developed.

To develop the caverns, four wells will be drilled into the Lotsberg formation and completed for cavern development. The caverns will be developed within AES mineral rights and entirely within SW 34-55-W4M, the site of the existing Strathcona Salt Cavern Storage Facility. The final outer edges of each cavern will not extend within 100 metres of the boundary of SW 34-55-21 W4M. A building for each wellsite will house instrumentation and controls. A separate shelter will enclose the wellhead.



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PROJECT  
PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT

CONSULTANT

YYYY-MM-DD 2021-03-30

TITLE  
**SALT CAVERN DEVELOPMENT (TO SCALE)**

DESIGNED SL

PREPARED CES

REVIEWED NF

APPROVED DV

PROJECT NO. CONTROL  
123513692-0028

REV.  
0

FIGURE  
6



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## Brine Storage and Brine Pump House

A brine pond, (or alternatively a set of brine storage tanks), and a brine pump house will be used in the operation of the storage caverns. AES is currently considering two options for brine storage: i) a storage pond as originally identified in the IPD; or ii) storage tanks. For the purposes of this DPD, and based on the likely design decision, AES is assuming a brine pond will be selected, but has included applicable information on the tank storage option where relevant or supportive.

During injection of NGL product into a cavern, brine is displaced from the cavern and is stored for future use. During withdrawal of NGL product from the cavern, brine is pumped from the brine storage back into the cavern. Refer to Section 9.5 of this DPD for additional details on the operation of salt caverns.

The brine pond will hold a maximum of approximately 400,000 m<sup>3</sup> of brine with a nominal depth of 8 metres and will occupy an area of up to approximately 120,000 m<sup>2</sup> (12 hectares). The brine pond may consist of a single cell or two cells, each with a volume of approximately 200,000 m<sup>3</sup>. The brine pond will be surrounded by a fence at the top of the slope to limit access by terrestrial wildlife and the public. As brine is displaced into the pond from the caverns, it will flow through a brine separator/de-gasifier vessel to ensure no NGL products enter the brine pond.

If brine storage tanks are selected, six tanks will hold a combined volume of approximately 300,000 m<sup>3</sup>. These tanks would be approximately 12 metres tall and 80 metres in diameter and would occupy approximately 60,000 m<sup>2</sup> of land (6 hectares). The brine tanks will operate essentially the same as a brine pond.

The brine pump house (approximately 20 metres by 15 metres) will be used to withdraw NGL products from the caverns. The brine pump house will contain approximately 900 kW of electrically driven pumps capable of moving up to approximately 1,300 m<sup>3</sup> per hour of brine into the caverns.

## NGL Product Handling Facilities

The NGL product handling facilities required for the delivery of NGL products into and out of the storage caverns and consist of pumps, product processing equipment, and related auxiliary facilities. Pumps and product processing equipment include:

- Electrically driven pumps (approximately 9000 kW) for injecting the NGL products into the caverns
- Filtration and separation equipment to condition the products withdrawn from the caverns
- Associated utility systems including electrical, controls, instrument air and flare
- Dehydrators to remove any water from the products prior to delivery to the customer

The design capacity of product injection and withdrawal from the NGL product handling facilities is expected to be up to 331 m<sup>3</sup> per hour per product, based on the customer needs for each of the NGL products. Auxiliary facilities will consist of electrical and control buildings.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

An internal site road network will be developed to provide operator access to the various process areas. Strathcona County will develop an access approach from Range Road 213 to AES' proposed site. This access will be for AES' sole use. The specific location of the required access road will be determined during the detailed design phase of the Project in coordination with Strathcona County.

## **Cavern Washing Pipelines**

Two new cavern washing pipelines, approximately 900 m long for each of fresh water and brine, will be constructed to connect the existing cavern washing infrastructure 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.

## **Brine Disposal Well**

One new brine disposal well will be developed for the proposed Project. This disposal well will be completed in the Nisku Formation approximately 1,000 m below surface. A part of the Winterburn Group, the Nisku Formation is a late-Devonian shelf carbonite that extends from Montana across the prairie provinces and into northeastern British Columbia. (Mossop and Shetsen 1994). The lower Nisku formation is distinguished by open-marine facies (Mossop and Shetsen 1994). The Nisku formation is appropriate for disposal due to its high porosity and permeability without the presence of naturally occurring hydrocarbons. Injection into the Nisku formation is common in oil and gas operations in Alberta.

AES holds an existing disposal scheme (Approval #7900C, as amended), issued by the AER, to dispose of brine into the Nisku formation and will amend the existing disposal scheme to add the new well, which will be utilized for the disposal of brine during cavern mining. This existing disposal scheme has been in place since 1982.

The Project would utilize the existing and new disposal wells primarily during Project construction to support cavern washing and disposal of brine. Disposal activities will taper out as the caverns near completion and saturated brine is directed to the brine pond.

## **NGL Pipelines**

Two pipelines, each less than 5 kilometres, will be constructed to convey NGL product to and from AES' customer. These pipelines will be installed within a single pipeline ROW.

## **9.2 Existing Facilities**

AES currently owns and operates an existing cavern washing facility and associated water and brine pipelines. This cavern development infrastructure, which was used in the development of AES' existing Strathcona Salt Cavern Storage Facility will also be used to develop the caverns for the proposed Project. The cavern washing facility is housed within a building and contains three electrically driven water pumps that total approximately 1,566 kW.

AES also owns and operates a multi-user, industrial water system consisting of an intake and pump station on the North Saskatchewan River and which includes an existing pipeline from the river pump station to the cavern washing facility. Water for cavern washing will be provided through this existing intake. The water works and diversion licenses are under *Water Act* Approval 346745-00-00 and *Water Act* Licence numbers 31016-00-00 and 327841-00-04, respectively. No

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

amendments to AES' existing *Water Act* Licences or Intake Approval are required to support the development of the caverns for the Project. The proposed Project will not require an increase in water withdrawal rates or volumes. No work at the site of the existing intake is required.

As discussed above, AES currently holds an existing brine disposal Scheme (AER Scheme Approval 7900C). An existing well associated with this Scheme, owned and operated by AES, will be utilized to support disposal of brine generated by cavern washing. This disposal well is completed in the Nisku Formation approximately 1,000 m below surface. This disposal scheme has been in use since 1982.

## 9.3 Third Party Infrastructure

Natural gas and electricity utility service will be extended to the proposed Project site by the local utility operators.

## 9.4 Description of Project Activities

The activities to be performed in relation to the proposed Project are described under the following categories:

- Construction of the components of the Project
- Operation for the life of the Project (25 years)
- Decommissioning of the Project facilities following completion of operations

These Project activities are solely for the benefit of AES, which is developing the Project infrastructure to provide services required by its customer.

Project activities are also discussed in Appendix B.

### Permanent and Temporary Structures

Permanent structures will consist of electrical and control buildings, surface piping, treating facilities, pumps, pipelines for water, brine, and onsite product, NGL pipelines, brine storage, wellsite facilities, 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 construction sites of this size (e.g. integrated workforce trailer systems). Temporary equipment, consisting of pumps and tanks, will be also used during the cavern development operations.

The Strathcona County Development Permit process includes application for the use of temporary structures and equipment, including the placement of these structures during construction and removal of these structures from the site once construction is complete.



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 9.4.1 Construction

The construction activities required for the proposed Project will be within the care and control of AES. Various mechanical, civil, structural, electrical, and other service contractors will be retained to perform activities required for drilling, brine pond and pumphouse construction, pipeline construction and product handling facility and related surface construction. These contractors will be procured as service providers to AES and any ability of these contractors to direct or influence the carrying out of the activity will be limited to related safety and environmental management activities (e.g. prime contractor responsibilities).

Third party infrastructure required to support the Project but outside of the care and control of AES consists of the power line extensions and gas utility connections required into the Project site to support the new infrastructure. Power line extension into the Project site will be under the care and control of Fortis Alberta. Gas utility connections will be under the care and control of the local gas utility. AES is a customer of these third parties and will not have the ability to direct or influence the carrying out of these activities.

Mitigation measures for potential effects from construction activities are described throughout this section and Section 19 and are included, as applicable, in Section 4 of Appendix B.

### **Salt Caverns and Injection Wells (Salt Cavern Development)**

Construction of the new cavern wells will commence with stripping the topsoil from the well pad area, followed by grading and gravelling of the well pad. Once the site is prepared, a drilling rig will be mobilized, and the rig will be assembled and prepared to drill the wells. The cavern wells will be drilled to a depth of approximately 1,900 metres, terminating in the Lotsberg formation. The wells will be completed for water injection to develop the caverns.

The wells will be cased and cemented to protect surface and groundwater. The surface casing, which provides initial containment of injected substances, will be set below the base of groundwater protection (i.e., the surface casing will extend through all shallow groundwater and will terminate at least 300 metres below the surface). The production casing will be set into the top of the Lotsberg formation, providing additional containment of injected substances and preventing products injected and withdrawn from interacting with the groundwater table or other formations or geology. Refer to Figure 6 for a scale diagram of these features and resulting caverns.

The caverns will be developed by injecting fresh water into the newly 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 of through disposal wells into a deep secure formation (the Nisku Formation) approximately 1,000 metres below surface. This process will occur continuously over a period of 40 to 50 weeks until the desired cavern size is achieved. As mining nears completion, and once brine becomes more saturated, brine will be retained and stored onsite for use during operations. As customers send product to the facility for storage, the brine that is stored in the cavern is displaced and stored in the brine pond. As customers withdraw product, brine is pumped from the brine pond back into the cavern.

AES holds two existing *Water Act* diversion licences for the purposes of cavern mining. These licences will be utilized for the proposed cavern mining and no additional water diversion licences will be required. As the Project will be utilizing existing water allocations through AES' existing and approved *Water Act* diversion licences, the Project will not result in any changes to existing allowable water withdrawals from the North Saskatchewan River. In the event of low-flow

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

conditions, water use would be managed by the terms and conditions of AES's existing *Water Act* diversion licenses and based on the priority numbers of these licences. The potential for water withdrawals from the North Saskatchewan River to affect surface water quantities in the North Saskatchewan River was a concern expressed by stakeholders. AES' response to this concern, including assessment of the potential effect, mitigative measures, and inspection and monitoring requirements are further discussed in Table 9 of Appendix B.

Following the completion of mining, wellbores will be converted for NGL storage. To demonstrate cavern integrity and obtain approval for product storage, various tests will be performed, and the results will be evaluated as part of the approval process by the AER. These tests include mechanical integrity testing to validate and prove integrity of the caverns and containment, cement bond logs, and casing integrity logs. These tests also establish baseline conditions, which are monitored over life of the wells and caverns.

The AER is responsible for regulating cavern development in Alberta and AEP and/or AER are responsible for regulating water diversion licences. For details on these and additional regulatory approvals required for cavern development, please refer to Section 18 of this DPD.

## **Brine Storage and Brine Pump House**

As stated above, AES is currently considering use of a brine pond or storage tanks for brine storage.

To construct the brine pond, topsoil and subsoil will be stripped from across the brine pond area and will be salvaged and stockpiled. Descriptions of the soil salvage, storage and erosion control measures are provided in Section 18 and Table 13 of Appendix B, and will comply with requirements of EPEA, EPEA Approval 357248-00-01, as amended, and Development Permit requirements from Strathcona County. This will include locating stockpiles away from other activities that could degrade soil quality or alter soil quantity and keeping other temporary or ongoing activities away from these stockpiles. Mitigation measures to control erosion will include reseeding the stockpiles to limit exposure of the soil to wind and water erosion, and noxious plant seeds. Surface water runoff will continue to be directed towards AES' existing approved stormwater management facility (Wetland W3). AES will implement stormwater runoff management procedures during earth works and reclamation activities.

The brine pond 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 and will be conducted in accordance with the conditions of a *Water Act* Approval that will be required to dewater the excavated area for construction and in accordance with the required *Water Act* (Dam Safety) Approval and EPEA Approval, as amended. Water that is pumped during the excavation of the pond will be contained, tested and directed through siltation control measures prior to being directed to the stormwater management facility (Wetland W3). If the groundwater quality does not meet release criteria, it will be diverted to AES' industrial water system for re-use or directed to an existing disposal well approved for this use.

Based on AES' experience with existing operations in the area and the proximity to the existing brine pond, it is expected that groundwater levels will return to pre-excavation conditions after construction of the brine pond is complete. AES plans to install a secondary dewatering system during construction of the brine pond to control groundwater beneath the brine pond during operations. AES will abide by the construction terms and conditions in EPEA Approval 357248-00-01, as amended, including implementation of appropriate soil stockpiling techniques and implementation of an erosion

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

and sediment control plan. AES will also obtain a *Water Act* Approval for the dewatering system, to allow for the diversion of water throughout operation of the Project to support operation of the pond.

Two layers of high-density polyethylene (HDPE) liner will be installed in the pond excavation, 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. An underdrain system will be installed below the HDPE liners to control groundwater beneath the bottom liner.

In the event that brine is stored in tanks instead of a brine pond, topsoil will be stripped from the tank area and stockpiled. The foundations for the tanks will be constructed by excavating to the required depth and installing structural fill material. The tanks will be built by welding the sheet panels into place, after which the impermeable liners and interstitial leak detection systems will be installed. The tanks would be equipped with redundant high brine level alarms and automatic shutdowns to prevent overfilling. AES will comply with all applicable storage construction and operation requirements.

The brine pump house will be constructed in conjunction with the brine pond or brine tanks. Once the location has been excavated to the required depth, the structure of the pump house will be constructed, followed by installation of mechanical and electrical components and the pump house building. Dewatering will be required for the excavation for the brine pumphouse and will be managed using the same processes and requirements as dewatering for the brine pond.

The AER will be responsible for regulating brine pond or brine tank storage development and operation, including issuing an EPEA Approval Amendment, a *Water Act* (Dam Safety) Approval, and a *Water Act* Approval for dewatering activities. If brine storage tanks are utilized, AES will obtain an EPEA Approval Amendment and an Alternative Storage Approval under *Directive 055: Storage Requirements for the Upstream Petroleum Industry* (AER 2001). Strathcona County will also be responsible for regulating development of the brine storage through a Development Permit. For details on these and additional regulatory approvals required for brine storage, please refer to Section 18 of this DPD.

## **NGL Product Handling Facility**

Construction of the product handling facility will begin with site preparation and grading. Once the site has been prepared, buried utilities will be installed, followed by building foundations, above ground piping, pumping and dehydration equipment, instrument air, flare system and other utilities, and electrical and control buildings.

The AER will be responsible for regulating development and operation of the product handling facility. Strathcona County will also be responsible for regulating development of the product handling and auxiliary facilities through a Development Permit. For details on these and additional regulatory approvals required for the NGL Product Handling Facilities, please refer to Section 18 of this DPD.

## **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. As these pipelines will be entirely within SW 34-55-21 W4M, they will be regulated as per CSA Z662 'Oil and Gas Pipeline Systems', and American society of Mechanical Engineers (ASME) B31.3 'Process Piping'.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## Brine Disposal Well

Construction of the brine disposal well will commence with stripping the topsoil from the well pad area, followed by grading and gravelling of the well pad. A disposal well will be drilled to a depth of approximately 1,000 m, terminating in the Nisku Formation. After drilling has finished, the well will be completed in accordance with *AER Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging, and Testing Requirements* (AER 1994).

The well will be drilled to the top of the Nisku Formation and cased with both surface and production casings to protect surface and groundwater. The surface casing will be set below the base of groundwater protection (i.e. the surface casing will extend through all shallow groundwater and will terminate below the base of groundwater protection). The production casing will be set into the top of the Nisku formation, providing additional containment and preventing fluids disposed of through the well from interacting with the groundwater table. Refer to Figure 6 for a scale diagram of the subsurface features.

Downhole injection of brine will be done in accordance with *AER Directives 051: Injection and Disposal Wells – Well Classifications, Completions, Logging, and Testing Requirements* (AER 1994). AES is a member of the Western Canada Cavern Operators Group (WCCOG), which is a coordinated group of cavern operators in and around the AIH. The AER requires the WCCOG to perform an annual pressure and temperature gradient survey of disposal wells followed by a summary report. In addition to the Nisku Formation injection volumes tracked for the WCCOG as a group, each individual operator is required to submit well reports in support of the summary report.

The AER will be responsible for regulating development and operation of the brine disposal well. For details, please refer to Section 18 of this DPD.

## NGL Pipelines

Construction of the NGL pipelines will commence with stripping the topsoil from the route, followed by excavating the required trench, installing the piping, and backfilling. Horizontal Directional Drilling, a trenchless installation method, will be used to install the pipelines under Astotin Creek. The wetlands and non-fish bearing water bodies traversed by the pipeline ROW may be trenched or installed via Horizontal Directional Drilling. If AES decides to trench these wetland and water body crossings, AES will obtain the services of a Qualified Aquatic Environmental Specialist to complete the required first surveys in support of a Wetland Impact Assessment Form for a notification under the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (GoA 2013). AES has no plans to permanently affect or remove any of the wetlands along the pipeline ROW. Once construction is complete, this disturbed area will be restored. The AER will be responsible for regulating development (and operation) of these pipelines. For details on this and additional regulatory requirements for these pipelines, please refer to Section 18 of this DPD.

## Third Party Infrastructure

Extension of electric and natural gas services will be conducted in accordance with the requirements of AES' utility providers.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 9.4.2 Operation

The operation of the proposed Project will be within the care and control of AES. The main facilities associated with operating the Project are the caverns, which will contain either brine or product at all times, the product handling facility which includes pumps, separators and dehydrators that will transfer the NGL products into or out of the storage caverns to meet customer requirements, and the brine pond which will facilitate product injection and withdrawal. Maintenance activities on these facilities will be ongoing throughout the operating life of the facilities.

AES commenced operation of its Strathcona Salt Cavern Storage Facility in 2016 and has a strong record of operating safely and in a manner that protects and maintains the surrounding environment. Our existing facilities are operated and maintained under a comprehensive asset management system that includes ongoing surveillance and inspections, integrity management, management of change, operator training, detailed integrity and operating manuals and an emergency preparedness and response plan. A Process Control System operates to control the facility's safety systems and operators are on-site 24 hours a day, seven days a week to provide continuous monitoring.

Specific operations, maintenance, and integrity manuals are in place for AES' existing facility and will be updated for the new infrastructure to ensure well, pipeline, and other equipment integrity over the life of the facility. These manuals are based on requirements of the *Oil and Gas Conservation Act* and *Pipeline Act* and associated Regulations, Directives, Codes and Standards. AES has also implemented asset-specific integrity programs and specific Operating Procedures and Preventative Maintenance programs for the facility and reviews and updates these procedures, manuals and programs at least every three years.

Mitigation measures for potential effects from operating activities are described throughout this section and are included, as applicable, in Section 4 of Appendix B.

### Salt Caverns and Injection Wells

The caverns are operated following approval of a cavern storage scheme issued by the AER. The approval to utilize the caverns for storage is dependent on a detailed evaluation of cavern and wellbore integrity and safety systems. Following initial approval, the AER maintains regulatory authority and oversight of the caverns throughout its operational phase. The caverns are operated as per the requirements of CSA Z341.2-18 *Storage of Hydrocarbons in Underground Formations* (CSA 2018) to ensure their ongoing integrity throughout the operating phase. This includes engineered safety systems to ensure pressure and flow rates are operated at specific operating pressures at all times. AES operates its existing caverns at pressures below the 80% limit required by CSA Z341.2 and will continue to do so for the proposed caverns. It also includes routine monitoring and testing of safety systems and periodic testing of cavern and wellbore integrity through mechanical integrity tests and full well workovers. In addition, a subsidence monitoring program will be developed and approved by the AER to monitor for any indication of changes to cavern shape over time.

The impermeability of salt to hydrocarbon products makes salt caverns ideal for NGL storage. In addition, the depth and pressure of the caverns makes the salt slightly deformable, which allows it to creep and self-seal any micro cracks that could occur. The caverns are always full of NGL product and/or brine and operate at a constant pressure similar to the surrounding rocks, which maintains cavern stability and the stability of the surrounding salt formation.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Refer to Section 18 of this DPD for additional detail on regulatory approvals required for operation of salt caverns and injection wells.

## Brine Storage and Pumphouse

The brine pond and pumphouse will be operated as per amendments to AES' existing EPEA Approval and as per a *Water Act* (Dam Safety) Approval, and *Water Act* (dewatering) Approval issued by the AER. The EPEA Approval will contain conditions for the ongoing management, monitoring and inspection (including where applicable, sampling and analysis requirements, parameters, and reporting frequencies) of soil, wetlands, flare stack, groundwater, stormwater and runoff throughout the life of the facility. The EPEA Approval also contains decommissioning and land reclamation requirements once the facility is no longer operational. The *Water Act* (Dam Safety) Approval will provide additional conditions to monitor and maintain integrity of the brine pond, complete inspections, monitoring and other controls. A specific Dam Safety Management Plan and Operations, Maintenance, and Surveillance (OMS) Manual are in place for AES' existing brine pond and will be updated for the new infrastructure. A *Water Act* (dewatering) Approval will also be in place and will have terms and conditions related water quality and quantity at the Project Site.

As brine is displaced from the caverns into the brine pond, it will flow through a pipeline to a degasification system, which prevents any NGL products from entering the brine pond. The brine de-gasifier serves to remove liquid and flashed hydrocarbons from the brine stream prior to the brine entering the brine pond. The flashed hydrocarbon vapours in the de-gasifier are routed to a connected flare stack for combustion. The piping trap adjacent to the brine de-gasifier allows brine to flow to the pond but prevents any condensate that may be floating on the surface of the brine from being sent to the pond. The condensate would be removed with the use of a skimming weir and nozzle on the de-gasifier and will be collected for re-use.

Under normal operating conditions, little or no vapour is expected to be flared. In the case of an upset, safety integrity level rated pressure and flow sensors will act in coordination with emergency shut-down valves to trap the hydrocarbon and brine mixture in the piping between the wellhead and the brine de-gasifier. The trapped hydrocarbons will then be flared at a controlled rate through the brine de-gasifier flare system.

The brine de-gasifier will only be in operation during injection of NGL product into the caverns when brine is displaced. NGL injection frequencies and rates will be periodic in nature and will depend on commercial agreements.

The following monitoring systems will be in place to monitor any potential brine leakage from the storage pond:

- A leak detection system, contained between two layers of HDPE brine pond liner
- A groundwater collection system beneath the bottom HDPE brine pond liner to control groundwater levels and enable groundwater testing
- Groundwater monitoring wells

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

The brine stored in the pond is expected to 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 precipitation. The brine composition will be primarily sodium chloride with a small amount of potassium chloride.

The brine pond will be lined and equipped with a leak detection system. Two layers of HDPE liner will be in place over the excavated pond, between which there will be a leak detection system. The lining system consists of an HDPE primary liner, underlain by a drainage network and leak detection system, underlain by an HDPE secondary liner, with a groundwater collection system beneath the entire pond system. The leak detection system will be comprised of a network of weeping tile piping connected to sumps.

The primary leak detection system will be comprised of a grid of perforated piping between the primary and secondary HDPE liners, which collects any liquid (or leachate) that passes through the primary liner and conveys this leachate into a leachate collection well. Within the leachate collection well, a pump operated on level control will return the leachate back to the pond. The rate of leachate pumping will be monitored remotely, with a signal generated from a flowmeter on the pump discharge. A pumping rate that exceeds the allowable leakage rate, calculated in accordance with the Action Leakage Rate Guideline (AENV 1996) and approved as per the required EPEA Approval, would indicate excessive leakage in the primary liner and the need for repair. The secondary HDPE liner will provide containment of primary liner leakage. In the unlikely event that both the primary and secondary HDPE liners were to experience significant leakage, this leakage would be detected through the groundwater collection system beneath the secondary HDPE liner.

The groundwater collection system will consist of a grid of perforated piping below the HDPE lining and leak detection systems, which will collect groundwater and convey it into a groundwater collection manhole. Within the collection manhole, pumps will begin operating on level control (i.e., when groundwater levels reach a set threshold) that will pump the groundwater to the brine pond in a closed loop system.

The brine pumphouse will be used to pump brine into the caverns to displace and withdraw NGL product. It will be constructed next to the berm of the brine pond. The brine pumphouse will contain electrically driven pumps capable of delivering approximately 1,300 m<sup>3</sup> of brine per hour from the brine pond into the salt caverns.

AES' existing Groundwater and Wetland Monitoring Program (GWMP; approved by the AER under the existing EPEA Approval) will be amended for the new brine pond. Annual groundwater monitoring reporting will be submitted to the AER as a term and condition of the EPEA Approval. Ongoing effectiveness of these monitoring programs will be evaluated and maintained.

The brine system also includes a supply/return pipeline to connect the brine pond and pump house to the cavern wells. This pipeline will transfer brine from the brine pond into the caverns during NGL product withdrawal and return brine to the brine storage pond during NGL product injection.

Refer to Section 18 of this DPD for additional detail on regulatory approvals required for operation of the brine pond.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## Product Handling Facility

The product handling facility will be used to inject and withdraw NGL products to and from the caverns. Product will be received from the pipelines and injected into the caverns using pumps. On withdrawal, product will flow from the caverns through dehydrators and out to the pipelines. The surface facilities associated with the existing Strathcona Salt Cavern Storage Facility and the proposed Project are regulated by the Alberta Boiler Safety Association (ABSA) and all surface design must be registered with ABSA, who will review and approve the design to ensure it meets requirements such as ASME B31.3 *Process Piping Code*. AES will also ensure it hires fully qualified power engineers to operate the facility and will ensure the facility is supervised by a Chief Power engineer and that each shift has oversight by a qualified shift engineer.

Refer to Section 18 of this DPD for additional detail on regulatory approvals required for operation of the product handling facility.

Prior to operation, and in order to receive approval for initial cavern storage, a comprehensive and facility specific emergency response plan (ERP) must also be prepared in accordance with *AER Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry* (AER 2017) and approved by the AER. This includes the calculation of an emergency planning zone for facility emergencies. The emergency planning zone for the existing facility is 820 metres from the centre of the ethylene wellhead at the existing Strathcona Salt Cavern Storage Facility. As part of the maintenance of the required ERP, stakeholders in the surrounding area are provided updates on an annual basis.

## Operation of Other Infrastructure

### Cavern Washing Pipelines

The freshwater pipelines that will be used during cavern development will see limited use during the long-term operation of the Project. Small volumes of water will be injected into the cavern wells to prevent salt from plugging the wellbores and freshwater may need to be added to the brine pond on an annual basis prior to winter to prevent salt crystals from precipitating out in the brine pond. This water will be diverted under existing AES Water Diversion Licences. No changes to these licences will be required as a result of the proposed Project.

### Brine Disposal Well

AES' brine disposal wells are developed primarily for cavern washing activities. Once salt cavern development is complete, the brine disposal system will be used infrequently. Examples include managing brine pond water or high wetland levels due to extreme precipitation events. These events are considered in AES' EPEA Approval terms and conditions, and AER-approved management plans for stormwater.



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## Stormwater Management

AES holds an approved Stormwater and Groundwater Management Plan submitted as part of EPEA Approval application 00357248 for the operation of the existing facility. AES will amend this Plan to include the construction and operation of the proposed Project facilities as part of regulatory applications for the proposed Project. The plan will allow for surface water and groundwater on the Project site to be collected and managed in compliance with EPEA and EPEA Approval requirements (as amended) and those requirements typical of an industrial facility of this nature.

Stormwater will be directed to Wetland W3, which will act as a storage basin for the Project. Wetland W3 has adequate capacity to function as a stormwater management facility for the Project site and is large enough to contain the 100-year 24-hour rainfall event, even when the water level is at the wetland boundary. Grading will take place as necessary to achieve positive drainage of all developed areas to drain towards W3. The new product handling facility and wellsite area for the proposed Project will also have a separate stormwater management pond to collect runoff water from those areas. Water from this runoff pond will be contained and tested prior to release to Wetland W3. Water stored in W3 will be managed passively, through evaporation and infiltration, and actively, through pumping, when the water level rises above the normal level of the wetland. During wet conditions, if the high-water level in Wetland W3 is greater than expected, a pump will be used to draw down the water level, and the water will be managed as per the EPEA Approval requirements, as amended. Overland discharge from the wetland to the adjacent environment is not expected. The existing general drainage path will be maintained for the offsite areas. These naturally drain towards W3, and it is important not to deplete the wetland.

The stormwater management facility will be monitored, and performance evaluated as per conditions of the existing EPEA Approval, as amended, and *Water Act* Approval conditions required for the Project. Reporting on the stormwater and groundwater management facility will be completed as per the conditions of EPEA Approval 357248-00-01, as amended.

### 9.4.3 Decommissioning

AES currently manages its asset retirement obligation (ARO) liabilities as per the International Financial Accounting Standards (IFRS), the AER's *Directive 001 Requirements for Site-Specific Liability Assessments in Support of the ERCB's Liability Management Programs* (AER 2012), *Directive 006: Licensee Liability Rating (LLR) Program and Licence Transfer Process* (AER 2016a), *Directive 011: Licensee Liability Rating (LLR) Program: Updated Industry Parameters and Liability Costs* (AER 2015), and *Directive 024 Large Facility Liability Management Program* (AER 2016). Decommissioning requirements for surface facilities (including the brine pond), pipelines, wells, and caverns are prescribed by the EPEA and *Conservation and Reclamation Regulation*, EPEA Approval 357248-00-01, as amended, *AEP Conservation and Reclamation Guidelines for Alberta* (AEP 1997), *AEP Environmental Guidelines for Pipelines* (AEP 1994), *AER Directive 013: Suspension Requirements for Wells* (AER 2020a), *AER Directive 020 Well Abandonment* (AER 2021), *CSA Z662 Oil and Gas Pipeline Systems* (CSA 2019) and *CSA Z341 Series 18 Storage of Hydrocarbons in Underground Formations* (CSA 2018).

The decommissioning techniques discussed in this section are based on current available technologies and practices. AES anticipates that decommissioning techniques and regulations will continue to evolve over the life of the Project. Although the Standards and Directives listed above are considered best practice today, AES understands that different Standards or Directives will likely be in force at the time.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

At the time of decommissioning, AES will engage and work with relevant regulatory authorities, Indigenous Communities, and other stakeholders with an interest in the physical works to determine the best decommissioning, remediation, and reclamation techniques and to ensure compliance with applicable laws. AES also notes that the Project is located in the AIH and the Project site and surrounding lands will be zoned for long-term industrial use. The lands are freehold and may be used for future developments by AES or could be remediated and sold to other private or industrial landowners. For the purposes of this section, the end use is assumed to be agricultural, as the pre-industrial development use was also agricultural. Decommissioning activities include removing all equipment and returning the Project site to an equivalent pre-development land capability. Progressive reclamation activities will occur following construction and during ongoing operation of the Project. Post-operation, final reclamation will commence.

At Project end of life, the salt caverns and wells will be decommissioned in accordance with CSA Z341.2 Storage of Hydrocarbons in Underground Formations. The standard prescribes requirements for each of: pre-abandonment activities; cavern abandonment; wellbore abandonment; and post-abandonment. Where the cavern system is to be abandoned, the cavern will be suspended from service for a period of time to collect data used to determine when the cavern will be in a state of static equilibrium such that abandonment can occur.

There are five major mechanisms that act within caverns that are inactive or abandoned: cavern dissolution, brine warming, salt creep, brine permeation, and leaks. These mechanisms have different impacts in the short, medium, and long-terms, therefore the cavern must be stabilized and monitored prior to abandonment operations.

The salt caverns will be emptied of hydrocarbon product prior to abandonment. The cavern well casing and wellhead integrity will be demonstrated prior to the stabilization monitoring period. After NGLs are removed, the caverns will be stabilized and pressure data, temperature, subsidence, and surface casing vent flow monitoring will occur. Brine will be periodically injected or withdrawn to maintain the brine pressure within an appropriate range.

A risk assessment will be conducted and quantified to predict when the cavern can be successfully abandoned to ensure integrity and stability. Once determined appropriate, the caverns will be abandoned. Caverns are expected to return to static equilibrium at the time of abandonment. A sonar survey will be conducted prior to cavern abandonment.

The cavern wellbores will be inspected, remediated (if required) and abandoned as required by CSA Z341.2. Abandonment of storage wells will ensure that all storage zones, non-saline aquifers, and hydrocarbon-bearing zones are isolated from the wellbore and not in communication. All downhole equipment and tubing strings will be removed prior to commencing abandonment operations. A bridge plug will be installed at the depth of the caprock above the Lotsberg formation and will be pressure tested and cement plugs will be placed in the well. All casing strings will be cut a minimum of one metre below ground level and will be covered with a cap to preclude pressure build up from within the well. After abandonment, risk assessments and subsidence monitoring will be conducted and maintained until the risks have become negligible.

All buildings, foundations, piles, and surface equipment will be removed from the site. Gravel will be removed, and disturbed areas will be recontoured. Subsoil and topsoil that was stockpiled during construction activities will be replaced at uniform depths and generally consistent with pre-development thicknesses. Areas where soil was replaced will be reseeded to limit erosion and potential for weeds.

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Remediation (if needed) and reclamation will occur during and following the decommissioning of the brine pond to achieve natural drainage patterns towards drainage features on site. Most of the disturbed areas will be recontoured to match the pre-disturbance drainage patterns, with the exception of the brine pond.

Surplus brine remaining in the brine pond after decommissioning of the salt caverns will be injected in the brine disposal wells for permanent disposal. The liners and associated infrastructure will be decommissioned and removed from site for disposal or recycling. The brine pond is expected to be reclaimed as a human-made water feature by stabilizing the dam slopes and recontouring as necessary to reduce erosion potential. The remaining excavation would be allowed to naturally fill with water.

If the brine storage tank option is selected, the brine tanks would be emptied of any surplus brine and dismantled. The materials would be removed from site and disposed of or recycled. The tank areas would be backfilled with subsoil prior to placement of the topsoil. The area would be recontoured and revegetated to match the surrounding area.

The site will be revegetated in a manner that is consistent with its proposed end land use. Areas will be seeded with species that are consistent with the surrounding lands and unlikely to be incompatible with other nearby land uses. A detailed revegetation plan with a seed mix reflecting the final land use will be established closer to the final reclamation phase.

Riparian vegetation around Wetland W3 is not expected to be affected during Project decommissioning activities, as physical works associated with the Project are setback from the wetland. The onsite Wetland W3 will not be directly affected by reclamation activities and will continue to be available as habitat for migratory birds and other wildlife species. Migratory birds will have access to Wetland W3 throughout Project construction, operation, and decommissioning activities. Terrestrial wildlife will have access to W3 after the construction phase.

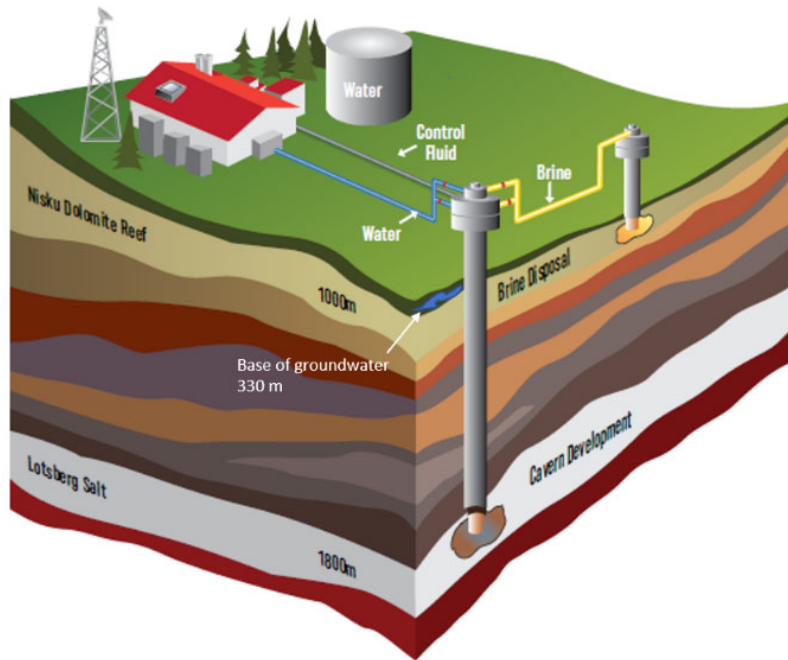
## 9.5 Background: Underground Cavern Development and Operation

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 7. 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. The AES caverns will be developed approximately 1,800 m below surface (top of cavern) and approximately 1,500 m below shallow groundwater.

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 (refer to Figure 7 and Sub-Figure 1 of Figure 8). (For a scale drawing of the actual depths of salt cavern development, refer to Figure 6). The disposal well is completed into a disposal formation at a depth of about 1,000 m, which is significantly below surface so there would be no interaction with surficial features or groundwater.

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Figure 7: Solution Mining Process (Not to Scale)



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.

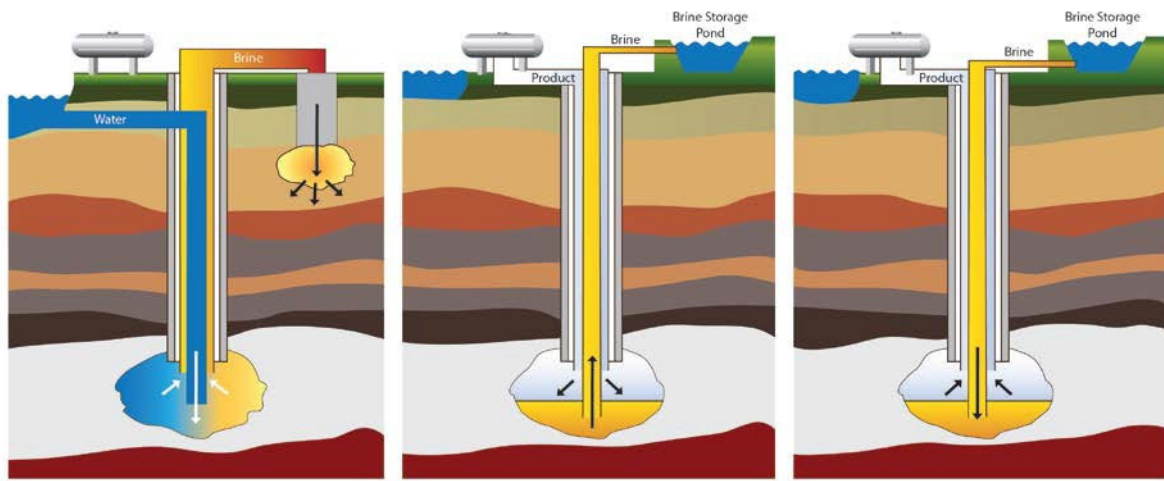
The control fluid is comprised of a hydrocarbon liquid that is less dense than water which floats on the brine. It is pumped into the cavern during the washing process to help protect and shape the roof section of the cavern. The amount of control fluid used is governed by the wash program, with all 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 (refer to Sub-Figure 2 of Figure 8). 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 (refer to Sub-Figure 3 of Figure 8). 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.

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Figure 8: Cavern Development and Operation (Not to Scale)



Cavern Development and Brine Disposal (Fig.1)

Liquid Injection and Brine Removal (Fig.2)

Liquid Withdrawal and Brine Injection (Fig.3)

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 10. ESTIMATED MAXIMUM PROJECT CAPACITY

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### *DPD Criteria*

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*An estimate of the maximum production capacity of the project and a description of the production processes to be used.*

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The target size of each of the four proposed underground storage caverns is 120,000 m<sup>3</sup>. Each cavern will have a working storage capacity of approximately 100,000 m<sup>3</sup>. 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.

With the exception of brine to be used in the ongoing operation of the Project, no production of any materials or substances will occur as part of the project. All NGL products stored in the proposed salt caverns will be produced and consumed by third parties. Product will be conveyed from a third-party location via pipeline to the caverns and injected. When NGLs are injected, brine will be displaced to the surface where it will undergo a de-gasification process and will be stored in the brine pond. Brine will be re-injected into the caverns when customers request withdrawal of their NGLs. A sufficient quantity of brine will be retained on site in the brine pond to enable the injection and withdrawal of NGLs from the caverns.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 11.PROJECT SCHEDULE

### *DPD Criteria*

*The anticipated schedule for the project's construction, operation, decommissioning and abandonment, including any expansions of the project.*

The proposed Project is planned to be in service by 2024. Construction of the Project is planned to commence in mid-to-late 2021 with site works in preparation for drilling the wells and beginning the solution mining process. Construction of surface facilities (i.e. the product handling facility and brine pond) would commence in 2022. Construction of the NGL pipelines is planned to commence in 2023.

Site preparation would begin in mid-to-late 2021. The first cavern well is planned to be drilled at the end of 2021, with the second and third caverns planned for early 2022. The fourth cavern is expected to follow later in 2022. Mining would occur from mid-2022 to mid-2024.

Construction of the product handling facility and brine pond are expected to commence in 2022. The majority of the construction is expected to be completed by the end of 2023 with tie-ins and commissioning planned to occur in late 2023 and early 2024.

Construction of the pipelines to convey NGL products to customers will commence in 2023. The pipelines are planned to be completed by the end of that year.

The estimated schedule for the Project is shown in Table 4.

*Table 4: Estimated Project Schedule*

Key Project Phase	Start	Finish
Prepare site (grading and leveling)	Q3 2021	Q4 2021
Construct cavern washing pipelines	Q4 2021	Q2 2022
Drill Wells	Q4 2021	Q3 2022
Cavern mining	Q2 2022	Q3 2024
Construct Product Handling Facility	Q3 2022	Q4 2023
Construct brine pond and pump house	Q3 2022	Q4 2023
Construct connecting pipelines	Q2 2023	Q4 2023
Commissioning	Q4 2023	Q1 2024
Begin commercial operation	Q2 2024	2049
Decommission and abandon <sup>1</sup>	2049	-

<sup>1</sup> Decommissioning and abandonment is based on a 25-year lifespan of the salt caverns.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 12.PROJECT ALTERNATIVES

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### *DPD Criteria*

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#### *A description of*

*(a) potential alternative means of carrying out the project that the proponent is considering and that are technically and economically feasible, including through the use of best available technologies; and*

*(b) potential alternatives to the project that the proponent is considering and that are technically and economically feasible and directly related to the project.*

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Various approaches were considered to minimize the Project footprint. The proposed brine pond will be located on privately owned land zoned for, and surrounded by, industrial development in the AIH. The AIH has been designated for industrial uses, and there are plans for several additional large projects in the area. Neighbouring public, government and industry generally view the AIH as more favourable for development and less disruptive to undeveloped lands than other regions of the province. The Project footprint is minimized by siting the Project and equipment where the Strathcona Salt Cavern Storage Facility is already located and on cultivated land out of areas with high wildlife habitat value or in areas with other environmental sensitivities.

The proposed Project site is proximal to existing industrial transportation corridors to minimize the establishment of new transportation corridors or increase transportation time, and to existing utilities. The Project Site is also proximal to labour and would not require prolonged commuting during operations.

Proximity to existing infrastructure required for the Project also minimizes the Project footprint. AES currently owns and has approval to operate a brine disposal scheme and cavern washing facilities at the Project site. These were used to develop the existing facility. AES also currently holds two Water Act Diversion Licences for withdrawal of water from the North Saskatchewan River for the purpose of cavern mining. Use of AES' existing infrastructure and *Water Act* Diversion Licences minimizes new developments and the use of resources that would otherwise be required on alternate sites.

Typically, when geology favours development of salt caverns, it is the preferred method for NGL storage (US Department of Energy 2017). Alternatives to the storage of NGL products in salt caverns include above ground storage in pressurized vessels or refrigerated tanks.

AES is not considering these alternatives to the proposed Project for the reasons outlined below:

- Above ground pressurized storage tanks are not being considered because:
  - The proposed Project will require approximately 400,000 m<sup>3</sup> of NGL product storage capacity. To store NGLs in pressurized vessels, the land needed for this volume of storage would significantly increase the project's footprint. Approximately 200 storage bullet tanks would be required to store the same volume as one cavern, resulting in the need for at least 800 storage bullet tanks at the surface.
  - Above ground pressurized storage tanks would require pressure relief systems, resulting in increased fugitive GHG emissions from the project that would not occur with storage in underground caverns.
  - Use of above ground pressurized storage presents the risk of vessel failure and accidental release of NGL product to the environment.



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- Use of above ground pressurized storage tanks are susceptible to impacts from weather and have the risk of corrosion or erosion.
- Above ground refrigerated storage tanks are not being considered because:
  - To store NGLs in refrigerated tanks, a substantial amount of energy would be required to cool, continually refrigerate, and reheat the NGL product for storage purposes.
  - Above ground refrigerated storage tanks would require pressure relief systems, resulting in minor fugitive GHG emissions from the project that would not occur with storage in underground caverns.
  - Use of above ground refrigerated storage presents the risk of vessel failure and accidental release of NGL product to the environment.
  - Use of above ground refrigerated storage tanks are susceptible to impacts from weather and have the risk of corrosion or erosion.

Ultimately, salt caverns were chosen over the alternative means described for safety, environmental and operational reasons. Salt caverns are considered the safest way to store large volumes of NGLs. The following factors are the main reasons salt caverns are the preferred storage method for large volumes of NGLs:

- The products are contained deep below ground (approximately 1,800 m in this case) in impermeable salt formations, with only limited surface footprint and facilities. The deep subsurface nature of caverns reduces the number of environmental and health receptors that could be impacted by the project than if surface infrastructure was selected. Refer to Figure 6 for a scale drawing of AES' existing caverns.
- Storage in salt caverns requires minimal surface land footprint (for wellheads) as storage occurs 1,800 metres below surface. Underground storage is extremely economic in terms of land area.
- There is negligible risk of structural failure of the cavern itself due to the properties and impermeability of the salt. Salt formations are almost perfectly impermeable.
- The impermeability of salt to hydrocarbon products makes salt caverns ideal to use for hydrocarbon storage. In addition, the depth and pressure of the caverns makes the salt slightly deformable, which allows it to self-seal any micro cracks that could form.
- The caverns are full of hydrocarbon product and/or brine at all times and operate at a pressure similar to the surrounding rocks, which enables and maintains cavern stability.
- High storage pressures present no problem as high pressure is the natural state of the fluids underground and caverns are maintained at similar pressures as the rock and salt around them.
- There is no risk of underground combustion. Underground, hydrocarbons are separated from the oxygen in the air (necessary for combustion) by nearly 2,000 meters of rock.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

- Caverns are not susceptible to accidents or malfunctions from adverse impacts from weather, corrosion, or erosion.
- There is negligible risk of accidental cavern damage. Their natural barrier prevents impacts from fire, willful damage and external impacts.
- Fugitive emissions from the use of caverns is negligible.
- Storage in caverns is not energy intensive. Once product is injected, no energy is required for long-term storage and low energy is required to withdraw product from the caverns.

As of 2018, Alberta had approximately 4.5 million m<sup>3</sup> of NGL storage capacity in above and below ground facilities (CERI 2018). Approximately 3.8 million m<sup>3</sup> of storage capacity consists of underground salt caverns and the remaining 0.7 million m<sup>3</sup> of capacity is in above ground tanks (CERI 2018). These facilities are mainly clustered around market hubs, pipeline connections, and fractionation facilities near Edmonton and the AIH and it is estimated that there are more than 60 caverns operating today in the Fort Saskatchewan area.

Other alternative means of carrying out the Project that relate to incidental facilities and activities required to operate the salt caverns that have been or are currently under consideration are described below.

- As noted in the IPD, the use of electric pumps for the injection and withdrawal of product from the caverns has been considered over natural gas engine driven pumps. Electric drive pumps have now been selected for the Project for their reduced GHG emissions, simpler maintenance, and operational flexibility.
- As noted in the IPD, the use of low emissions calcium chloride dehydration of NGL product versus molecular sieve dehydration which requires greater energy input was being considered. Calcium chloride dehydration has now been selected for the Project for its reduced GHG emissions and lower capital cost.
- As noted in the IPD, the need for a gas chromatograph to measure the composition of the product received at and delivered from the storage facility is being considered. Product quality measurement requirements are still under evaluation and will be determined later in the Project.
- As noted in the IPD, alternative locations for the brine pond and product handling facility within the Project site are being considered. The specific locations of these facilities on the site are still under evaluation. The main factors being considered are constructability, efficient land use, and construction costs. It is possible that the project will be wholly contained within SW 34-55-21 W4M and that the use of NW 27-55-21-W4M and NW 34-55-21 W4M (Lot D) will not be required, reducing the overall Project footprint.
- Aboveground brine storage tanks are being considered as an alternative to a brine pond as they potentially offer better constructability and options for construction sequencing (i.e. the tanks can be built over time, not all at once if not needed), operational flexibility, and easier maintenance than a brine pond. Conversely, brine storage tanks have not been utilized by industry to date, are more costly, and are much more visible surface facilities than a brine pond. Both options would be regulated as per AER EPEA Approval amendments to AES' existing EPEA Approval. In addition, brine storage tanks would be further regulated by an Alternative Storage Approval under *Directive 055: Storage Requirements for the Upstream Petroleum Industry* (AER 2001).

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

- AES is considering the use of approximately 5 hectares on Lot D, a 16-hectare lot privately owned by AES on the southern portion of NW 34-55-21 W4M, directly north of the existing facility, for storage of existing stockpiles currently located on SW 34-55-21 W4M that were established as part of the existing Strathcona Salt Cavern Storage Facility. The approximately 5 hectares of Lot D that would be utilized for stockpile storage are currently approximately 20% grasses and 80% trees and shrubs. Utilization of this area would include both existing stockpiles at SW 34-55-21 W4M (relocated) and topsoil and subsoil associated with the excavation of the new brine pond. Stockpile locations would be maintained at least 30 metres from the boundary of a wetland located in the northeast corner of Lot D. Disturbance of existing vegetation on Lot D has been considered as part of the GHG Emissions Report provided in Appendix C and as part of GHG emissions calculations required by the SACC and described in Sections 6 and 23. Lot D is depicted as a project option on Figure 2.

Based on the above information regarding NGL storage alternatives, it has been demonstrated that cavern storage is a safer, more energy efficient, and less disruptive method to store large volumes of NGLs. Further, AES has demonstrated that many design decisions have been made to reduce GHG emissions associated with the Project and direct GHG emissions are now limited to pilots for the two flare stacks, which are in place for upset conditions or infrequent maintenance of operating equipment and minimal fugitive emissions from piping and process equipment. AES will continue to evaluate GHG emissions as they relate to any potential future alternatives as detailed engineering is finalized. Refer to Section 6 for additional information on alternatives that will be considered in the future to limit or offset flare stack emissions and potential emissions associated with decommissioning.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## PART D: LOCATION INFORMATION

### 13. GEOGRAPHIC INFORMATION

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#### *DPD Criteria*

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*A description of the project's proposed location, including*

*(a) its proposed geographic coordinates, including, for linear development projects, the proposed locations of major ancillary facilities that are integral to the project and a description of the spatial boundaries of the proposed study corridor;*

*(b) site maps produced at an appropriate scale in order to determine the project's general location and the spatial relationship of the project components;*

*(c) the legal description of land to be used for the project, including, if the land has already been acquired, the title, deed or document and any authorization relating to a water lot;*

*(d) the project's proximity to any permanent, seasonal or temporary residences and to the nearest affected communities;*

*(e) the project's proximity to land used for traditional purposes by Indigenous peoples of Canada, land in a reserve as defined in subsection 2(1) of the Indian Act, First Nation land as defined in subsection 2(1) of the First Nations Land Management Act, land that is subject to a comprehensive land claim agreement or a self-government agreement and any other land set aside for the use and benefit of Indigenous peoples of Canada; and*

*(f) the project's proximity to any federal lands.*

---

The geographic centre of the proposed Project site is Latitude 53° 47' 27.23 and Longitude 113° 02' 45.13".

The proposed Project will be located at the existing Strathcona Salt Cavern Storage Facility site, approximately 14 kilometres northeast of the City of Fort Saskatchewan and approximately 30 kilometres north of the City of Edmonton, in Strathcona County, Alberta. The surface facilities for the proposed Project will be located on privately owned land zoned for, and surrounded by, industrial development within the AIH.

The proposed Project will be developed on a total land area of approximately 24 to 34 hectares pending final design. The Project will be developed on SW 34-55-21 W4M, with the potential use of a 5-hectare area in Lot D NW 34-55-21W4M for soil stockpiles, and the potential use of approximately 20 hectares in the northern portion of the adjacent NW 27-55-21 W4M parcel for surface facilities. These areas of potential development are currently considered alternatives. AES holds the land title (fee simple) for SW 34-55-21 W4M, NW 27-55-21-W4M and Lot D of NW 34-55-21 W4M. Copies of the legal title for the land parcels are provided in Appendix E.

The Project is located approximately 500 metres north of secondary Highway 15. The proposed site is proximal to existing industrial transportation corridors. The Project Site is also proximal to labour and would not require prolonged commuting during operations.

To support responses to IAAC's Summary of Issues, AES conducted a survey of cavern operations in the area. Existing cavern operations are presented in Table 5. All existing caverns within a 5 kilometre radius of the Project are in SW and SE 34-55-21W4M and are owned and operated by AES or ATCO Gas and Pipelines. The nearest caverns not owned or operated by ATCO are approximately 8 kilometres away from AES' proposed Project and existing Strathcona Salt Cavern Storage Facility.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

The proposed caverns will be developed in the Lotsberg Salt Formation at SW 34-55-21 W4M where AES holds Special Mineral Lease No. 3712020336. The salt caverns are each approximately 100 metres in diameter and will be developed fully within the boundary of SW 34-55-21 W4M. Minimum spacing between the cavern centres will be at least 200 metres, as prescribed by the AER requirements for salt cavern development, and 100 metres away from edge of mineral rights.

No potential effects to existing caverns associated with other nearby facilities are expected due to adherence to regulatory guidelines and AES' experience operating caverns in the area.

*Table 5: Cavern Development within 5 Kilometres of the Project*

Licensee	Licensee	Operator	Formation	Mode
100/02-34-055-21 W4/0	ATCO Pipelines	ATCO Pipelines	Lotsberg	Storage
102/02-34-055-21 W4/0	ATCO Pipelines	ATCO Pipelines	Lotsberg	Storage
100/07-34-055-21 W4/0	ATCO Pipelines	ATCO Pipelines	Lotsberg	Storage
102/07-34-055-21 W4/0	ATCO Pipelines	ATCO Pipelines	Lotsberg	Storage
103/07-34-055-21 W4/0	ATCO Pipelines	ATCO Pipelines	Lotsberg	Storage
104/07-34-055-21 W4/0	ATCO Pipelines	ATCO Pipelines	Lotsberg	Storage
100/11-34-055-21W4/0	ATCO Energy Solutions	ATCO Energy Solutions	Lotsberg	Storage
100/12-34-055-21W4/0	ATCO Energy Solutions	ATCO Energy Solutions	Lotsberg	Storage
102/06-34-055-21W4/0	ATCO Energy Solutions	ATCO Energy Solutions	Lotsberg	Storage
102/05-34-055-21W4/0	ATCO Energy Solutions	ATCO Energy Solutions	Lotsberg	Storage
103-06 -34-055-21W4/0 (under development)	ATCO Energy Solutions	ATCO Energy Solutions	Lotsberg	Storage

The closest community to the Project is the Town of Bruderheim, which is approximately 5 kilometres east of the Project site. There are two occupied residences within 1.6 kilometres of the Project. Proximity of the Project site to nearby communities is shown in Figure 9. Nearby energy infrastructure, occupied residences, private water wells, and archaeological sites are shown in Figure 10. The wells shown in Figure 10 were obtained through the publicly available data on the Alberta Water Wells website. Each well is georeferenced via GPS or to the legal land description where the well is located. If GPS coordinates have not been provided for a well, the well will be depicted in the centre of the quarter section or legal subdivision (Alberta Water Wells 2021). As a result, some wells in Figure 10 may appear to overlap or be clustered at the centre of certain quarter sections or legal subdivisions.

The closest schools, retirement homes, or recreational facilities are approximately 5 kilometres from the Project in the Town of Bruderheim and are shown in Figure 11. The Project will not be visible from any recreational areas or navigable waters.

The proposed Project is located within Treaty 6 and Métis Harvesting Area D, which extends from the east to the west of the province and from near Ponoka as the southernmost extent to north of Conklin. No lakes or rivers where Métis Harvesting is permitted are located within 10 kilometres of the Project site (GoA 2019).

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

The closest First Nation reserve is the Alexander First Nation, approximately 50 km northwest of the Project site. First Nations reserves and Métis Settlements are shown in Figure 9. The bed and banks and associated setbacks along the North Saskatchewan River are the closest Crown land to the Project Site, approximately 4.5 kilometres away. It is unlikely that Traditional Use activities are occurring in this area due to barriers to accessing this land (i.e., access via land would involve crossing private land) and the proximity to industrial activities occurring in the AIH.

The closest federal lands to the Project are Elk Island National Park, located approximately 13 kilometres to the southeast of the Project site. Environmentally Significant Areas, Federal Lands, and Airports are shown at a smaller scale in Figure 12. Note that due to the scale, no First Nations reserve lands or Métis Settlements are visible in Figure 12. Environmentally Significant Areas are generally defined as areas that are important to the long-term maintenance of biological diversity, physical landscape features and/or other natural processes, both locally and within a larger special context (Fiera 2014).

To support the response to IAAC's Summary of Issues, potential human receptors in the local and regional study area, including residences and sensitive receptors, and the distance of these receptors from key Project components and activities are identified in Figure 11. The location of local and regional drinking water sources and water treatment facilities, including their proximity to the Project site are also included in Figure 9. Water wells in proximity to the Project site are shown in Figure 10.

The closest water treatment facility to the Project is the EPCOR Rosedale Water Treatment Plant, located approximately 40 kilometres southwest of the Project site. The Project is not expected to result in increased use of the facility or to strain available water processing capabilities.

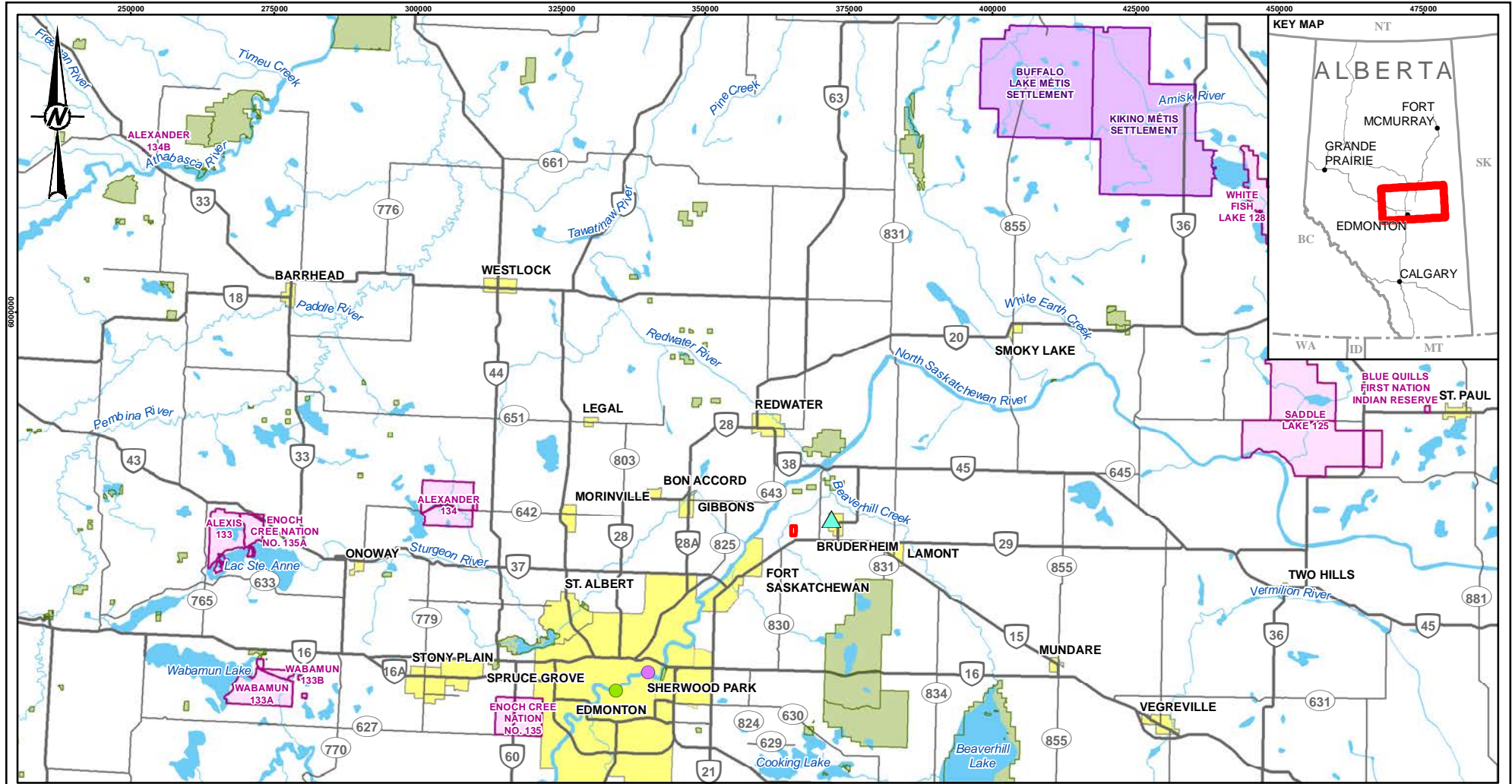
The closest wastewater treatment facility to the Project is the Alberta Capital Region Wastewater Commission facility, located approximately 25 kilometres southwest of the Project site. The Town of Bruderheim has a Smart Wastewater Treatment system where wastewater is treated through a stabilization lagoon system. The stabilization lagoon system consists of a series of nine ponds that gradually clean the water through a series of naturally occurring physical, biological, and chemical processes (ToB 2021). The Project is not expected to result in increased use of the facility or the stabilization lagoon system, or to strain available wastewater processing capabilities.













There are no domestic water wells within the Project site. There are 11 existing groundwater monitoring wells within SW 34-55-21-W4M (refer to Figure 10). These monitoring wells are associated with the Strathcona Salt Cavern Storage Facility GWMP, required by EPEA Approval 357248-00-01, as amended.

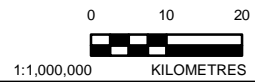
Due to the locations and limited proximity of regional drinking water sources and water treatment facilities relative to the Project site, and the limited extent of any potential effects of the proposed Project on surface water quality, as evaluated in Appendix B, there is very limited potential for drinking water (i.e. surface and groundwater sources), water used for recreational purposes, and water treatment facilities to experience effects as a result of Project activities. The existing Project site has a septic system and domestic water is trucked to the facility. The Project will not directly interact with potable water infrastructure or water wells outside of the Project Site. AES' existing GWMP on the Project site would prevent infiltration of contaminants into the shallow groundwater. Mitigation measures described in Sections 9, 19 and Tables 9 and 10 of Appendix B would prevent Project activities from affecting surface water or shallow groundwater outside the Project site. No activities during operations are predicted to interact with any wells used for domestic or agricultural purposes. AES has operated the Strathcona Salt Cavern Storage Facility since 2016 and in that time has not received a complaint from any nearby occupants regarding well water quality or quantity.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

The Project will have design and other mitigation measures to prevent leaks and spills as described in Section 6 of Appendix B. Effects of spills are expected to be largely contained through appropriate mitigation measures and within the Project Site. There is very limited potential for spills of fuels, hydrocarbons, or other products to interact with any local potable or publicly used water sources. No effects are expected as a result of these activities due to planned mitigation measures, including design and engineering controls. In the event of a spill or discovery of contamination, AES has an established spill response, containment, and clean up procedures that would contain a spill before it could extend outside of the Project site. As such, no means to mitigate and monitor effects outside of the Project site are expected to be required.



-  BRUDERHEIM STABILIZATION LAGOON SYSTEM
-  EPCOR WASTEWATER TREATMENT PLANT
-  ROSSDALE WATER TREATMENT PLANT
-  FIRST NATION RESERVE
-  MÉTIS SETTLEMENT
-  PROJECT SITE
-  PRIMARY HIGHWAY
-  SECONDARY HIGHWAY
-  WATERCOURSE
-  PARK / PROTECTED AREA
-  POPULATION CENTRE
-  WATERBODY



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YYYY-MM-DD	2021-03-31
DESIGNED	SL
PREPARED	NF
REVIEWED	CES
APPROVED	DV

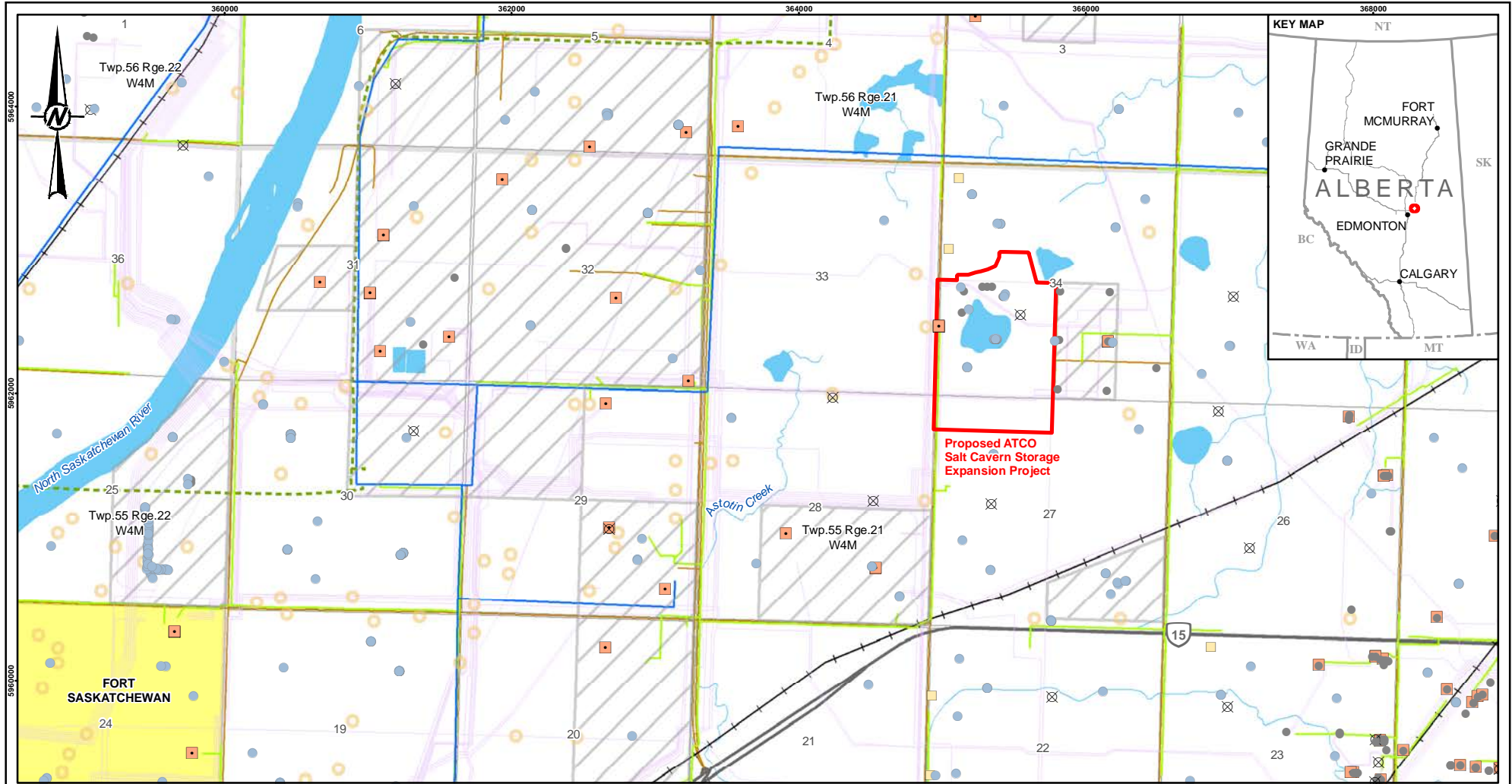
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 PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT  
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**

TITLE  
**FIRST NATIONS, MÉTIS SETTLEMENT, AND LOCAL COMMUNITIES**

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM ANS/A





- ⊗ ABANDONED OIL/GAS WELL
- ACTIVE OIL/GAS WELL
- HISTORIC RESOURCE SITE
- OIL/GAS FACILITY
- OCCUPIED RESIDENCE (RECEPTOR)
- WATER WELL (ANY)
- PIPELINE
- TRANSMISSION AND DISTRIBUTION LINE TYPES
- 240 kV
- 138 kV
- 13.8 kV or 25 kV
- ▭ INDUSTRIAL SITE
- ▭ PROJECT SITE
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- LOCAL ROAD
- RAILROAD
- WATERCOURSE
- POPULATION CENTRE
- WATERBODY



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CONSULTANT

YYYY-MM-DD	2021-03-31
DESIGNED	SL
PREPARED	NF
REVIEWED	CES
APPROVED	DV

**REFERENCE(S)**  
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 PROJECTION: UTM ZONE 12 DATUM: NAD 83

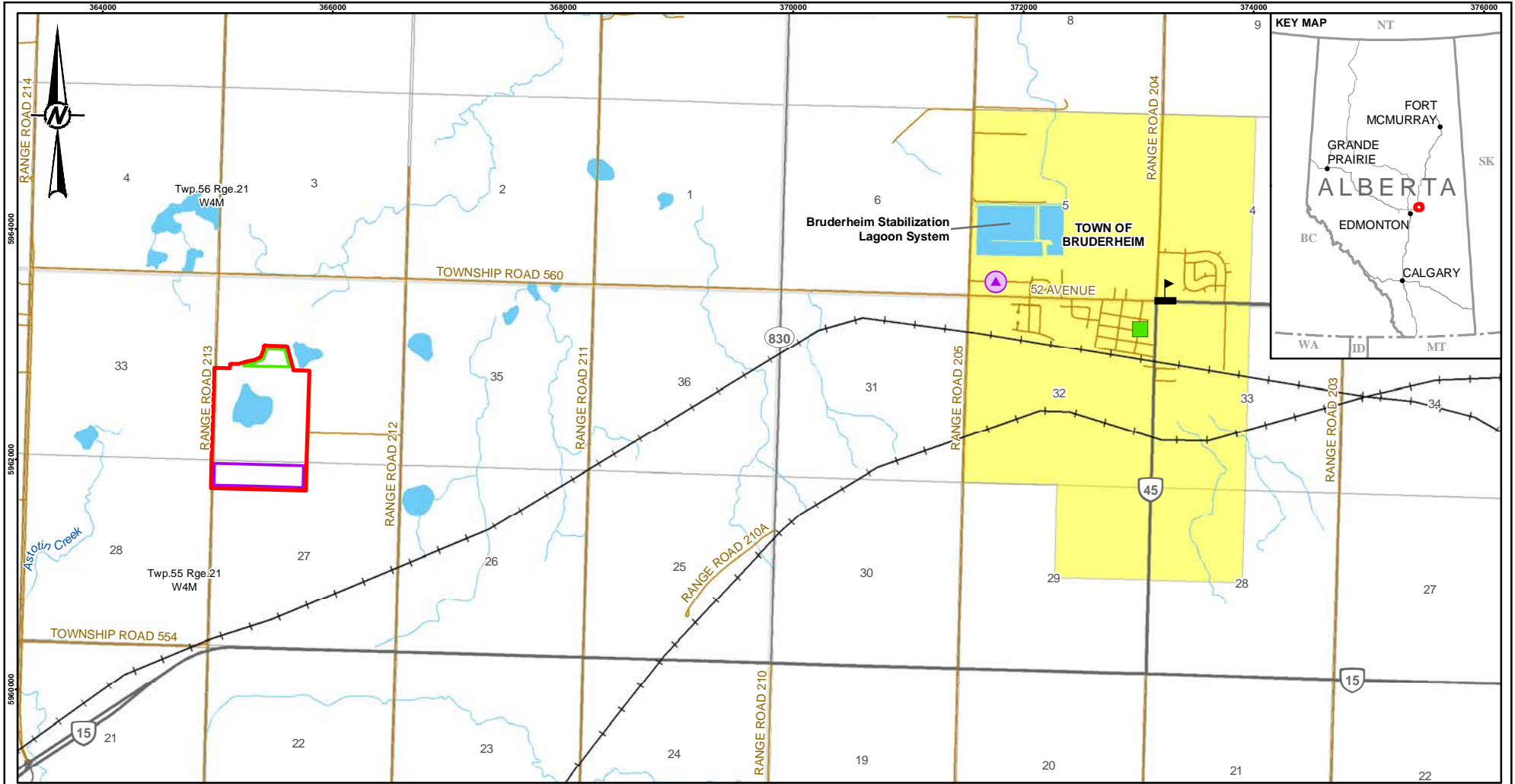
PROJECT  
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**

TITLE  
**ENERGY INFRASTRUCTURE, OCCUPIED RESIDENCES, PRIVATE WATER WELLS AND ARCHAEOLOGICAL SITES**

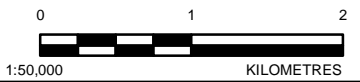
PROJECT NO.	CONTROL	REV.	FIGURE
123513692-0022		0	10



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- AGRICULTURE GROUND
- BRUDERHEIM SCHOOL
- SENIOR CITIZENS RESIDENCE
- PROJECT SITE
- OPTIONAL - LOT D
- OPTIONAL - NW 27-55-21 W4M
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- LOCAL ROAD
- RAILROAD
- WATERCOURSE
- POPULATION CENTRE
- WATERBODY



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APPROVED	DV

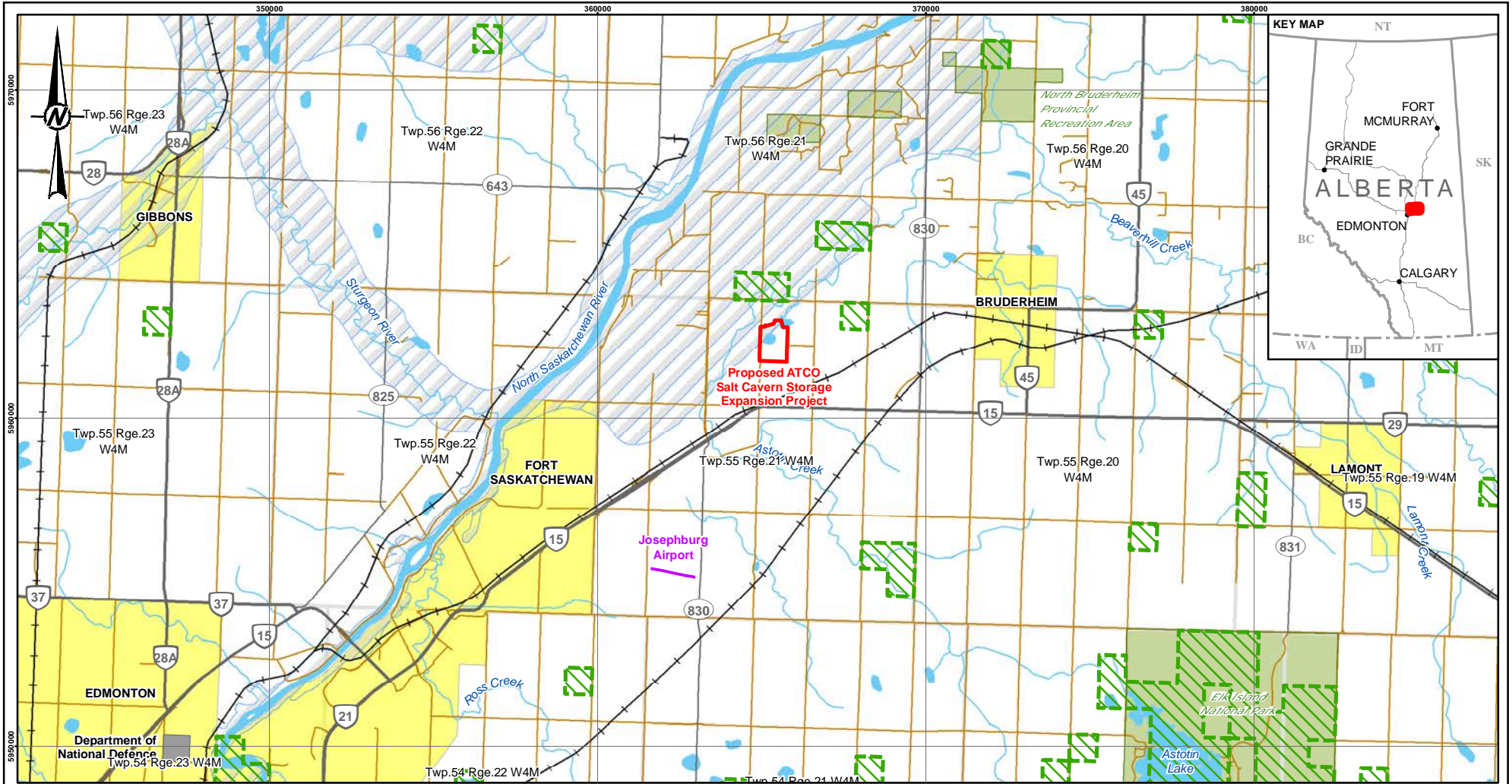
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PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT  
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**

TITLE  
**PROXIMITY TO SCHOOLS, SENIORS' LODGING AND RECREATIONAL SITES**

PROJECT NO. 123513692-0024 CONTROL REV. 0 FIGURE 11

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- RUNWAY
- ▨ ENVIRONMENTALLY SIGNIFICANT AREA
- FEDERAL MILITARY LAND
- KEY WILDLIFE AND BIODIVERSITY ZONE
- PROJECT AREA
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- LOCAL ROAD
- + RAILROAD
- PARK / PROTECTED AREA
- POPULATION CENTRE



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**ATCO ENERGY SOLUTIONS**

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YYYY-MM-DD	2021-03-30
DESIGNED	SL
PREPARED	NF
REVIEWED	CES
APPROVED	DV

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PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT  
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**

TITLE  
**ENVIRONMENTALLY SIGNIFICANT AREAS, MILITARY AND FEDERAL LANDS, AND AIRPORTS**

PROJECT NO.	CONTROL	REV.	FIGURE
123513692-0026		0	12

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM ANSIA

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 14. PHYSICAL ENVIRONMENT

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### *DPD Criteria*

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*A description of the physical and biological environment of the project's location based on information that is available to the public.*

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The proposed 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 (Natural Regions Subcommittee 2006).

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 Subcommittee 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 Subcommittee 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.

The Project is surrounded by a number of petroleum, petrochemical, and chemical facilities that contribute to the overall emissions inventory in the region. The climate and meteorology in the AIH exhibit a general tendency for regional winds from the northwest, due to the proximity to the North Saskatchewan River. Wind speeds in the exposed rural areas of the AIH average from 3.2 to 3.6 m/s (11 to 13 km/h). Annual precipitation across the AIH is uniform (Jacques-Whitford & RWDI 2007).

The topography in the general area of the Project is gently undulating. The Quaternary deposits in the region consist of pre-glacial, lacustrine, aeolian, and fluvial deposits. The pre-glacial Beverly Channel, which has been infilled with sand and gravel deposits (Empress Formation), is the most widely used aquifer in this area (Stantec 2014a).

The Project site is located within the boundaries of the North Saskatchewan Air Zone, which includes both the Capital Region Airshed Zone and the 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 nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), fine particulate matter (PM<sub>2.5</sub>) and ozone (O<sub>3</sub>).

The AIH climate is generally characterized by mild summers and cold, relatively dry winters. The Köppen-Geiger climate classification system identifies the region as a Dfc, which is a sub-arctic climate characterized by snow in the winter, generally humid, with cool summers (Kottek et al. 2006). ECCC maintains a network of climate stations across the country and the station at Fort Saskatchewan provides information on the local climate. Based on a 30-year data record, the most recent of which is publicly available is the 1981 to 2010 period, climatic conditions are shown in Tables 6 and 7.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 6: Regional Temperature Extremes and Averages, 1981 - 2010

Temperature (°C)	
Extreme maximum	36.5°
Extreme minimum	-45.6°
Warmest average month	July, 17.1°
Coldest average month	January, -17.3°
Average annual number of frost-free days	117 days

Source: ECCC 2020a

Table 7: Regional Precipitation Extremes and Averages, 1981 - 2010

Precipitation	
Average annual rainfall	345 mm
Average annual snowfall	109.7 cm
Average total precipitation	454.6 mm
Wettest average month	July, 92.0 mm
Driest average month	December, 20.2 mm

Source: ECCC 2020a

Wind data are not reported from the Fort Saskatchewan station, but are available from a station approximately 20 kilometres to the east located in Elk Island National Park. Winds recorded at Elk Island station show an average annual wind-speed of 6.4 kilometres per hour (km/hr) and little variability by month, ranging from a high of 7.7 km/hr in May, to a low of 5.4 km/hr in August.

The FAP monitors air quality in the region through ten continuous ambient air quality monitoring stations. In 2019, FAP also operated a regional passive monitoring network, monitoring for SO<sub>2</sub> and hydrogen sulphide (H<sub>2</sub>S). During 2019, one hundred fifty-one (151) 1-hour exceedances of PM<sub>2.5</sub>, hydrogen sulphide (H<sub>2</sub>S), and O<sub>3</sub> parameters were reported (FAP 2019). Of these 151 exceedances, four were attributed to local industry. The largest contributor to 1-hour exceedances in 2019 was wildfire smoke, with ninety-nine (99) recorded exceedances. In 2019, thirty-eight (38) 24-hour exceedances of parameters were reported. Of these 38 exceedances, one was attributed to local industry (FAP 2019). The largest contributor to 24-hour exceedances was wildfire smoke, with 17 recorded exceedances (FAP 2019).

In general, air quality in the FAP is good, with monitoring stations reporting Air Quality Health Index Low Risk levels between 85 to 100% of the time (FAP 2019). No station exceeded more than 0.051% of time in the High-Risk category and no station exceeded more than 0.07% of time in the Very High-Risk category (FAP 2019). In 2019, FAP monitoring stations captured 56,085 hours of air quality data (FAP 2019).

The Project will be a very small contributor to air emissions within the local air shed. Presently, AES is not required to conduct ambient air quality monitoring under EPEA Approval 357248-00-01, as amended. Ambient air quality monitoring in the region is conducted and managed by the FAP. At present, AES is not an industry member of FAP and does not anticipate any Project-specific obligations for monitoring given its small contribution to emissions. In addition, AES will comply with the Capital Region Air Quality Management Framework. However, there are currently no Project-specific commitments associated with this framework, as it applies to NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>2.5</sub>, and dust. NO<sub>2</sub>, PM<sub>2.5</sub>, and dust are expected to be minimally emitted during Project construction and negligible volumes of NO<sub>2</sub> will be emitted as part of Operations

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

(Refer to Appendix C). No SO<sub>2</sub> emissions will be generated by any phase of the Project. Strathcona County has developed management plans that could be applicable to the Project, including a heavy industrial policy area within its municipal development plan, area structure plan and county land use bylaws. AES has met with Strathcona County to discuss the Project and will adhere to the relevant requirements of these plans through Project planning into construction and operation of the Project.

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 majority of the wetlands present on the Project site are Graminoid Marsh (Golder 2020). Wetland W3 is a Crown-claimed 5.22-hectare wetland in the centre of SW 34-55-21. AES has retained this wetland for drainage/stormwater management. There are three to four graminoid marshes intersected by the area under consideration in NW 27-55-21-W4M. These likely comprise three ephemeral-to-temporary wetlands and one seasonal wetland (Howell 2021). The lands being considered in Lot D are adjacent to one wetland, which is Class IV Graminoid Marsh (Wetland W1) and one water body classified as Class IV Shallow Open Water (Golder 2020). Both wetlands are Class IV (Golder 2020). If AES selects Lot D as an option for the Project, the development will be set back from these wetlands and will not disturb the bed or banks of either wetland.

AES plans to continue to use Wetland W3 as a stormwater management facility. If AES selects NW 27-55-21-W4M as an option for the Project, development of the Project may overlap some of these temporary-to-ephemeral wetlands or the seasonal wetland. AES will obtain the services of a Qualified Aquatic Environmental Specialist to complete the required field surveys in support of a Wetland Impact Assessment Report for a *Water Act* Approval if any Project activities are anticipated to affect any additional wetlands associated with the Project Site.

Wetland W1 is located in the northeast corner of SW 34-55-21-W4M and is not intended to be used for surface runoff. Fluctuations in groundwater levels beneath Wetland W1 are lower, likely as a result of its connection to the more highly transmissive surficial saturated sand further to the northwest (Stantec 2006; Shell 2007). As a result of this transmissive and saturated sand to the north, Wetland W1 north of the site is considered to be in connection with Astotin Creek.

Surficial sand deposits are variably saturated across the Project site. The majority of the saturated surficial sands are restricted to the north of the Project site with surficial sands in the other areas in the central and southern portions of the Project site generally not present or unsaturated (i.e., around Wetland W3). Therefore, when these sands are unsaturated, there is no direct hydraulic connection of Wetland W3 to Astotin Creek.

The water table surface within the Project site generally mimics the topography of the site with elevations ranging from approximately 625 metres above seas level (masl) in the southeast corner of the Project site to 618 masl in the centre of the Project site in the area near Wetland W3. The water table is strongly influenced by Wetland W3. Wetland W3 accepts surface water runoff from the surrounding land and appears to fluctuate between approximately 618 and 622 masl based on historical air photos of the site (Stantec 2021). Given this range of water levels, groundwater is thought to be recharged by Wetland W3 during wet periods and discharged to Wetland W3 during dry periods. During periods of high runoff, Wetland W3 would recharge the surficial aquifer and the primary direction of horizontal groundwater flow would likely be northwest toward Astotin Creek. There is no direct connection between Wetland W3 and Astotin Creek. However, there may be some latent connection between the two, which would only occur during periods of high runoff and high-water levels in Wetland W3, such as high precipitation (>1:100 year event) or snow melt events (Stantec 2021). AES has

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an existing Stormwater and Groundwater Management Plan approved under EPEA Approval 357248-00-01, as amended, and would implement approved methods to reduce levels in Wetland W3 if the water level in Wetland W3 was expected to exceed 621.2 masl.

Under current terms and conditions of AES' existing Water Act approval for dewatering beneath the existing brine pond, AES is obligated to ensure that no substance that will adversely affect the area associated with the activity or any water body is deposited, and AES is obligated to ensure that no water is released into a waterbody unless the quality of water is equal to or better than the quality of water in the receiving water body. AES will be required to comply with similar Approval conditions for the proposed Project.

AES will complete a survey of the pipeline ROW prior to start of construction. This survey will be used to develop the Environmental Alignment Sheets and Access and Construction Maps discussed further in Section 18. The wetlands along the pipeline ROW are likely to be seasonally flooded graminoid marshes and one temporary graminoid marsh (Howell 2021). If AES decides to trench these wetland and water body crossings, AES will obtain the services of a Qualified Aquatic Environmental Specialist to complete the required first surveys in support of a Wetland Impact Assessment Form for a notification under the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (GoA 2013). AES has no plans to permanently affect or remove any of the wetlands along the pipeline ROW.

The Project site is located within the North Saskatchewan River watershed in an area of relatively flat topography with localized depressional features.

The North Saskatchewan River derives its name from the Cree *kisiskâciwanisîpiy*, meaning "swift-flowing river" (Caron 2018). The North Saskatchewan River is a glacier-fed river that flows east from the Canadian Rockies to central Saskatchewan. The Project site is located approximately 4.5 kilometres south-east of the North Saskatchewan River and approximately 200 metres east of the lower portion of Astotin Creek in an area consisting of agricultural field and mixed industrial land use. Local topographic relief is relatively low, and generally slopes northwest towards the North Saskatchewan River located approximately 4,500 metres west-northwest of the site. At the edge of the river valley, the topography slopes steeply toward the river (approximately 30% slope).

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* (SARA). Astotin Creek is classified as a Class C waterway, which means that the waterway is considered moderately sensitive and would be considered as having broadly distributed habitats supporting local populations of fish species; habitat areas are sensitive enough to be potentially damaged by unconfined or unrestricted activities in the water body (GoA 2004). Forage fish have been observed upstream of the Project pipeline ROW crossing, however due to beaver damming on Astotin Creek, it is unlikely that sport fish or large-bodied fish could access the reach of Astotin Creek traversed by the Project's pipeline ROW (TEPCA 2007). Discussions with operational staff suggest that Astotin Creek has been observed running dry in previous summers, however it is conservatively assumed to have the potential to provide habitat for forage fish.

Fish inventories of Astotin Creek have shown presence of small-bodied fish, including brook stickleback (*Culaea inconstans*), fathead minnow (*Pimephales promelas*), and one large-bodied fish, white sucker (*Catostomus commersonii*; FWMIS 2021). No sport fish have been reported and Astotin Creek is not stocked (FWMIS 2021). No benthic invertebrate surveys for Astotin Creek are available for public review. Although no sensitive species have been identified in Astotin Creek, it drains into the North Saskatchewan River. The North Saskatchewan River supports habitat for lake sturgeon

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(*Acipenser fulvescens*), a species that is designated as Threatened under Alberta's Wildlife Act and recommended by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) to be designated Endangered under SARA. The designation of Endangered status under SARA is pending (GoA 2021b). The lake sturgeon is considered At-Risk by DFO (DFO 2021).

There are no fish-bearing surface waterbodies or watercourses present within AES's Project site.

The Government of Alberta has implemented the Water Management Framework (WMF) for the Industrial Heartland and Capital Region (AEP 2016). The goal of the WMF is to improve water quality in the North Saskatchewan River by minimizing load discharge, setting contaminant concentration thresholds in the Devon to Pakan reach of the North Saskatchewan River, and assigning values to contaminant concentration thresholds to inform management responses (AEP 2016). The WMF seeks to minimize impacts to water quantity by optimizing the use of existing and new withdrawal infrastructure and increasing the use of retained water (AEP 2016).

At the time of the wetland assessment site visit in August 2020, the Project site was composed of the existing Strathcona Salt Cavern Storage Facility surface infrastructure and agricultural land. Given the extensive existing disturbance across and in the vicinity of the Project site, 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. Environmentally Significant Areas and Federal Lands are shown in Figure 12.

The Project site 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 in Alberta (AEP 2015), may use the Project site to forage for small rodents
- Ungulates may use the Project site for feeding and traveling
- Small mammals may use the Project site for traveling and foraging

No terrestrial wildlife species have been reported in the Project site during previous wildlife inventories. Four bird species, black-throated green warbler (*Dendroica virens*), Clark's nutcracker (*Nucifraga columbiana*), sora (*Porzana Carolina*), and white-winged scoter (*Melanitta fusca*), have been reported in the Project site during previous wildlife inventories (FWMIS 2021). All four species are considered sensitive in Alberta (GoA 2015). None of the species observed on the site have been assessed by COSEWIC, nor are they listed as Extirpated, Endangered, Threatened, or Special Concern under SARA.

Approximately 10 hectares in the northwest corner of SW-34-55-21-W4M sits within a Key Wildlife Biodiversity Zone (KWBZ) (refer to Figure 12). KWBZs are areas identified by AEP as having high biodiversity potential and/or being key ungulate winter habitat. Restricted activity periods apply to all projects in the KWBZs. During development of the existing Strathcona Salt Cavern Storage Facility, the Project site was also located within an Environmentally Significant Area, however the methodology to identify Environmentally Significant Areas changed in 2014, and as such, the Project is no longer considered to be in an area that meets the criteria of an Environmentally Significant Area (Fiera 2014).



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Although a portion of the Project site is within a KWBZ, the lands have already been disturbed by long-term agricultural activity and the development of the existing Strathcona Salt Cavern Storage Facility. There is no high suitability habitat present for ungulates or extensive native vegetation. The Project site is identified as having low wildlife habitat suitability on the basis that the surrounding area is heavily industrialized, with a major industrial complex located nearby. The proposed Project is located in an area that has been under cultivation for more than 40 years, with virtually all native habitats having been displaced (Stantec 2014b).

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## 15.HEALTH, SOCIAL AND ECONOMIC CONTEXT

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### *DPD Criteria*

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*A description of the health, social and economic context in the region where the project is located, based on information that is available to the public or derived from any engagement undertaken.*

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#### **Health Context**

The most recent census data available for review was the Strathcona County Census 2018. The 2020 Census was cancelled in response to the state of public health emergency declared by the Government of Alberta in response to the COVID-19 pandemic (Strathcona County 2020a). In 2018, the total population of Strathcona County was 98,381, with 71,332 people living in Sherwood Park (the Urban Service Area) and 27,049 living outside of Sherwood Park in smaller cities and towns, farms, country residential communities, and other hamlets (the Rural Service Area; Strathcona County 2018a).

Strathcona County is located in the Alberta Health Services Edmonton Zone. The Community Profile of Strathcona County excluding Sherwood Park indicates that the long-term health of the population is consistent with the rest of Alberta, with minor deviations between prevalence of chronic health conditions between residents of Strathcona County and the rest of Alberta (Alberta Health Services 2019). The leading causes of mortality in Fort Saskatchewan are neoplasms (e.g., cancer), circulatory disease, and external causes (i.e., injuries). This is consistent with the mortality rate of the province of Alberta, with slightly higher incidences of neoplasms and circulatory system mortality in the Rural Service Area versus Alberta and a slightly higher incidence of external causes for the province of Alberta compared to the Rural Service Area (Alberta Health Services 2019).

Residents within the Edmonton Zone have access to numerous patient services, with most services located within the urban centres. Approximately 99% of the residents of the Rural Service Area of Strathcona County receive medical care from outside their geographic zone. There are 0.0 family physicians per 1,000 people within the Rural Service Area (Alberta Health Services 2019). The closest hospital to the project is the Fort Saskatchewan Community Hospital, offering a range of acute and outpatient care.

In Alberta, health indicators are aggregated at the Alberta Health Services Zone-level. The statistics provided in this section apply to the Edmonton Zone, which includes the City of Edmonton and Strathcona County, Sturgeon County East Sturgeon County West, Beaumont, Leduc and Devon, Thorsby, Westview and the cities of Sherwood Park, Stony Plain and Spruce Grove, and St. Albert (Alberta Health Services 2019). Prevalence of obesity and overweight health indicators in the Edmonton Zone are consistent with Alberta averages, with a slightly higher prevalence of obesity in men in the Edmonton Zone (26.6% versus 23.3% province-wide; Alberta Health Service 2019).

Self-perceived mental health indicators in the Edmonton Zone are consistent with the rest of Alberta, with approximately 70% of respondents at a local and provincial level reporting that they consider themselves to be in excellent or very good health (Alberta Health Services 2019). The most common mental health services accessed in the Edmonton Zone are outpatient community mental health treatment services. Approximately 93% of mental health services accessed were outpatient community mental health treatment service. Slightly fewer Edmonton Zone residents accessed addiction residential treatment and detox services in comparison to all of Alberta. Slightly more residents of the Edmonton Zone accessed opioid dependency programs than in comparison to all of Alberta (Alberta Health Services 2019).

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## Health Effects and Mitigation Measures

Potential health effects from the Project including planned mitigation measures are assessed in Section 4 of Appendix B and discussed in Sections 13, 22, and 24 of this DPD. No measurable residual effects on health are expected as a result of the Project. Refer to the introduction of Table 3 and the footnote on Table 3 in Appendix B for a further discussion on linkages between Valued Components and Human Health.

There are minimal air emissions associated with construction of the Project. Most air emissions associated with the Project will occur during construction as a result of dust and the use of diesel construction equipment. During construction, AES will undertake dust mitigation and erosion and sedimentation control measures to reduce potential effects of dust and particulate matter. The Project will not have emissions that could deposit atmospheric contaminants to the surrounding environment and there are no potentially acidifying substances that will be emitted by the Project. The use of diesel burning on- and off-road equipment will not occur continuously during construction and no acute or chronic effects from exposure to diesel are predicted (refer to Section 24 and Table 6 of Appendix B). Any noticeable effects from use of diesel or emission of dust and particulate matter during construction are expected to be short-term and not noticeable outside of the Project site. Due to the limited and infrequent nature of these emissions, there is no measurable residual effect as a direct result of dust and particulate matter and no predicted effects to surface water quality or vegetation and wetlands as a result of these emissions. As noted, the Project is located a considerable distance from any water treatment facilities and is not expected to interact directly with any water infrastructure.

During the operations phase of the Project there are no emissions predicted that could deposit atmospheric contaminants to the surrounding environment and there are no potentially acidifying substances that will be emitted by the Project. Air emissions will be infrequent and limited to intermittent flaring and fugitive emissions. Due to the limited and infrequent nature of these emissions and the absence of dust and particulate matter or metals, no measurable residual effects to human health or to surface water or vegetation and wetlands are predicted.

An increase in noise emissions is predicted to occur during the construction phase due to increased activity on the site and the addition of on- and off-road construction equipment. This noise will be short-term, intermittent and limited to the local area. Given the Project location, a noticeable increase in noise emissions is not predicted. The Project will comply with the requirements of *Directive 038: Noise Control* (AER 2007) and with noise bylaws within Strathcona County. AES has operated the existing Strathcona Salt Cavern Storage Facility since 2016 and has received no noise complaints or feedback from the public regarding noise levels. The existing facility is operating within permissible sound levels and no additional noise control is required. Noise dampening technology is well understood and if an exceedance is noted during operation of the Project, noise dampening equipment will be installed. No noise levels or types of noise that could cause effects to human health (e.g., infrasound) are predicted to occur as part of Project operations.

The landscape surrounding the proposed Project is presently a mix of industrial development and cultivated lands. The majority of the Project components will be constructed adjacent to AES's existing Strathcona Salt Cavern Storage Facility and will not result in a significant change to the landscape. It is not anticipated that construction of the Project will significantly change visual aesthetics or affect nearby residents.

Four new operators are expected to be hired as a result of this Project. AES' priority is always safety, and all employees support and adhere to our core value of "Safety First, Always." Safety is the first consideration in everything AES does and factors into every business, construction and operational decision made and every action taken to ensure that AES

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conducts its operations in a safe, responsible manner. AES believes that a job can only be done if it can be done safely and with a mind to operational sustainability. AES has a comprehensive health and safety management system and its health and safety policies and procedures are continually improved to ensure the protection of its employees and contractors, and the public.

As a critical infrastructure provider, AES is committed to responsible development and environmental and social sustainability. AES cares for the natural, cultural, and historical resources of the communities in which AES works and serves and understands that its success depends on its ability to operate in a sustainable and responsible manner, today and in the future. AES considers the environment in its designs and works to minimize any adverse environmental affects from its operations. As part of ATCO's annual Stewardship Report, it shares key metrics demonstrating its commitment to its collaborative and long-term approach to environmental stewardship.

## Social Context

The population of the Rural Service Area has increased by approximately 2,000 or 7.9% since 2005. The population of the Rural Service Area in 2005 was 25,169 and increased to 27,049 in 2018. The median age of Strathcona County inclusive of the Urban Service Area and Rural Service Area increased from 37 in 2005 to 40 in 2018. As of 2014, the average life expectancy of men in Strathcona County was 79.53 years and 84.18 years for women (GoA 2014a). The average life expectancy of men in Canada was 79.7 years and 83.9 years for women (Statistics Canada 2018).

As of 2016, approximately 4% of the population of Strathcona County identified as Indigenous (Strathcona County 2016). This is higher than the Alberta average of 2.8% of the population, however most Indigenous peoples in Strathcona County reside in the Urban Service Area. As of 2016, 0.8% of the Rural Service Area of Strathcona County identified as Indigenous (Alberta Health 2017). There are no First Nations Reserves or Métis Settlements located within the boundaries of Strathcona County.

Of the 97,020 residents of Strathcona County surveyed in the 2016 Canada census, 7,150 identified as visible minorities (Government of Canada 2016). There is no data available on the number of people in Strathcona County who identify as LGBTQ+2S (Sherwood Park News 2020).

The Strathcona County Rural Service Area has a lower percentage (4.9%) of lone-parent families compared to Alberta in general (11.5%; Alberta Health Services 2019). Female lone-parent families outnumber male lone-parent families at a rate of nearly 2:1 (4.9% to 2.7%; Alberta Health Services 2019). The Rural Service Area also has a lower percentage (7.7%) of after-tax low-income families than Alberta in general (15.6%; Alberta Health Service 2019). Food bank usage statistics for the Rural Service Area are not available, however Strathcona County (Urban Service Area and Rural Service Area) noted an 87% increase in usage of the Strathcona Food Bank from 4,897 visits in 2014 to 9,151 visits in 2017 (Strathcona County 2018b). The increase in food bank usage coincided with the decline in oil prices that impacted oil and gas employment across Alberta.

One women's shelter for abused women and children operates in Strathcona County (A Safe Place 2020). The shelter is located outside of the Rural Service Area. There are no women's emergency centres within the Rural Service Area (GoA 2020b). No seniors' emergency, homeless shelters, second stage (i.e., non-crisis), or long-term supportive housing is available in Strathcona County (GoA 2020b). All types of emergency and homeless shelters are available in Edmonton (GoA 2020b).

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Overall, women in Canada make up 22% of the Canadian oil and gas workforce (PetroLMI 2018). This percentage of employment is consistent with women's participation in the oil and gas industry in 2006 (PetroLMI 2018). The proportion of visible minorities in the oil and gas workforce nearly doubled between 2006 and 2016, from 7% to 13%. The proportion of visible minorities in the workforce in Canada is 21% (PetroLMI 2018).

## Social Effects and Mitigation Measures

Potential social effects from the project are assessed in Section 4 of Appendix B and further discussed in Sections 21 and 22 of this DPD. No measurable residual effects are expected as a result of the Project. Potential negative interactions between Project personnel and vulnerable people were considered and mitigation measures specific to the Project are provided in Table 17 of Appendix B. The potential for an increase in temporary workers during construction to adversely affect vulnerable populations is limited. Potential Project effects (positive or negative) to vulnerable members of society, including Indigenous Communities (i.e., Indigenous women, girls, youth, and LGBTQ2S+) will continue to be considered as part of AES' normal course of business and throughout Project planning, construction, and operations.

The Project Site is located within the AIH in a largely industrial and agricultural area. The number of temporary workers required for the Project is relatively low and will be phased throughout construction. The total construction workforce is anticipated to be approximately 350 to 450 workers, with onsite workers at any given time peaking at approximately 175 to 200 over the course of the 2.5 years of construction. It is expected that Project personnel would remain onsite throughout daily work duties and would not be interacting with any members of the community while at the Project Site. Individuals unaffiliated with Project construction activities (i.e., individuals who are not employed by AES or by its contractor or affiliated with any inspection and monitoring activities) will not be permitted on site.

The majority of direct and indirect workers associated with the Project are expected to be sourced from the regional area. Such workers would be in the region regardless of the proposed Project, meaning the Project is unlikely to increase the potential for negative interactions between temporary workers and vulnerable members of the population.

Due to proximity of the Project site to urban centres, there is no need for the provision of group housing or temporary accommodations. In the event a small number of temporary workers are required from outside the region, it is expected these workers would stay in purpose-built temporary accommodation (i.e. hotels) across the regional area and for short durations. The majority of temporary workers that are not from the regional area are not expected to remain in the regional area during days off or for prolonged periods and would be expected to stay in a variety of local hotels.

Vulnerable populations are only expected to be exposed to the Project Site if they are part of the temporary or permanent workforce hired for the proposed Project activities. AES provides training on awareness of cultural values, race and gender-based (and other forms of) discrimination and AES employees who will be working directly with Indigenous Communities, Indigenous Contractors, or other Indigenous-focused populations are also provided training on the history, culture and the legal and traditional rights of Indigenous Peoples in Canada. All AES employees are required to complete Indigenous Cultural Awareness training to understand the history of Indigenous Peoples and current issues and concerns facing Indigenous Peoples. AES will also consider offering this training to contractors if it is not provided through the selected vendors.

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To date, over 6000 ATCO employees have completed Indigenous Awareness Orientation, which provides foundational information on the history and culture of Indigenous Peoples in Canada and ATCO's history of partnerships with Indigenous groups. Additional training on Indigenous culture and peoples is discussed in Section 22. ATCO also provides skills training and apprenticeship opportunities to Indigenous peoples and education and training programs that further support diversity and inclusion which are discussed in Section 22.

AES has a Violence and Harassment Policy and Prevention Plan and enforcement action will be taken for discrimination or harassment. AES is committed to providing a work environment in which all workers are treated with respect and dignity. AES will take whatever steps are reasonable to protect workers from the potential hazards associated with workplace harassment and violence and provides procedures and means for summoning assistance and reporting incidents or concerns. AES will investigate any reported incidents of harassment or violence related to Project personnel in accordance with the Occupational Health and Safety Act and the Alberta Human Rights Act. If an employee or contractor is found to be acting in a harassing, threatening, or illegal manner, AES will implement disciplinary actions up to and including termination of the employee or contractor, or reporting the worker's actions to the appropriate authorities.

ATCO is committed to enhancing and sustaining a workplace culture that is inclusive and diverse and this vision is embedded in ATCO's Core Values of Agility, Caring, Collaboration and Integrity. ATCO believes that organizations with diverse teams perform better and improve creativity and innovation and that the strength of ATCO's workforce comes from diversity. All employees have the responsibility to maintain an environment that is safe, respectful and productive and everyone has the right to be treated fairly within the workplace in an environment that recognizes and accepts diversity.

AES has a Diversity and Inclusion (D&I) Committee which has a vision to enhance and sustain a workplace culture. The Committee has embarked on a multi-year journey underpinned by some clear short and long-term goals to increase visibility and awareness of D&I within the organization (e.g. through training and learning opportunities), to foster and enhance an inclusive culture (e.g. through engagement sessions and events) and to put strategy and structure in place to embed D&I within the organization (e.g. D&I data collection, target setting and increased accountability). One of AES' recent focus areas has been embedding 'D&I moments' into the various teams' meetings- a forum where open and honest discussions can be had on any diversity and inclusion issues.

While the proposed Project will only result in the addition of approximately four permanent employees, AES is committed to ensuring that its vision for inclusion and diversity remains a key consideration in its hiring process and part of its contractor selection process for construction activities. AES' policies ensure AES hires people based on their experience and expertise and provide opportunities for advancement to promote diversity, equity, and inclusion.

Based on the above, AES' influence on negative effects to vulnerable populations in the regional area through the Project is limited. AES will continue to look at specific employment measures for uplifting and educating vulnerable members of Indigenous Communities and other vulnerable groups and will work towards removing barriers to participation in economic opportunities created by the Project.

AES will also continue to facilitate cross-cultural education through means such as employee Indigenous awareness training, as described above. AES is also open to site visits with community elders or other opportunities for Indigenous Communities to transmit their traditional knowledge of the area to AES.

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ATCO is committed to ongoing support of vulnerable populations. Since 2006, ATCO and its employees have raised nearly \$47 million for charities as part of its annual Employees Participating In Communities campaign. ATCO also has a partnership with the Homes For Heroes Foundation to provide housing for veterans at risk of homelessness and has committed a \$1.5 million gift-in-kind donation to support the foundation. In 2020, ATCO partnered with local support organizations in Calgary to deliver 11,700 meals to seniors that were financially impacted by the COVID-19 pandemic, and that lived alone, with a caregiver or in a seniors' complex.

## Economic Context

The most recent economic information available for Strathcona County is in the 2018 Strathcona County Community Social Profile. It is assumed that the depression in global oil and gas prices and economic impacts from the COVID-19 pandemic have also impacted the financial environment in Strathcona County. The primary industry in Strathcona County is petrochemical and hydrocarbon processing. Associated sectors, such as engineering, construction, manufacturing, business accommodation, and the general service sector are all highly dependent on petrochemical and hydrocarbon processing (Strathcona County 2017).

The median income in Strathcona County is higher than the Alberta and Canada average. The median income of all households in 2016 was \$140,039, while the Albertan median was \$109,997 and the federal median was \$88,306 (Strathcona County 2018b). In 2018, approximately 50% of the population of Strathcona County was employed full or part time. The other 50% included children who were not yet in school, students including K-12 and post-secondary students, retirees, and those who were not in the workforce. (Strathcona County 2018a).

In 2011, 65% of employed residents in Strathcona County worked outside of Strathcona County and 50% of workers employed in Strathcona County did not live in the county (Strathcona County 2017). Strathcona County's location in close proximity to the capital city of Edmonton and the associated road infrastructure (e.g., Anthony Henday ring road) allows for direct access to and around the Edmonton region, facilitating improved inter-community travel and movement of goods (Strathcona County 2017). Strathcona County is part of the Edmonton Metropolitan Region and is part of the Edmonton Metropolitan Region Growth Plan (EMRB 2017). The Edmonton Metropolitan Regional Structure to 2044 designates much of the south portion of Strathcona County as Zoned and/or Designated Country Residential or Natural Living System (ERMB 2017). The proposed Project is located in a Major Employment Area (ERMB 2017).

The AIH is a major economic driver of the province with companies and development in the region exceeding \$1.5 billion of annual spending in locally sourced goods and services and an additional spend of approximately \$80 million per year in municipal taxes (AIHA 2017). As of 2017 the AIH was expecting to add at least four large industrial projects that would add over \$36 billion GDP to the economy during construction and \$4 billion GDP per annum of operations (AIHA 2017). The construction phase of these projects is anticipated to add at least 281,000 person years of direct employment during construction and 28,000 full time equivalent (FTE) jobs during each year of operations (AIHA 2017).

The Project will serve demand for NGL storage in the AIH. The Project is not reliant on the four industrial projects cited in AIHA's projections and is not expected to contribute directly to the development or economic impacts of this anticipated growth. However, expansion of NGL product storage is predicted to indirectly contribute to economic growth in the region (refer to Section 7). This indirect growth is predicted to result from existing operators having secure access to feedstock and reducing potential upsets to feedstock supply. The addition of one job to the chemical storage and processing industry is predicted to result in the addition of five jobs in other areas of the economy (CIAC 2017).

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The AIHA outlook provided dates to 2017 and economic conditions have changed considerably since 2017. The economic outlook of the region and for Alberta in general has been heavily impacted by COVID-19. By the end of 2020, Alberta had recovered approximately three-quarters of the jobs lost between February 2020 and April 2020, however economic activity is still currently weak, and recovery will take time (GoA 2021a).

## Economic Effects and Mitigation Measures

Potential economic effects from the project are assessed in Section 4 of Appendix B as well as Sections 7 and 22 of this DPD. Economic effects of the Project are expected to be positive.

Development of the Project is not expected to substantially change the current standard of living or property values in the immediate area. The Project will be developed on privately-owned lands that have been held by AES and other ATCO entities for nearly 40 years. Property values are not expected to increase or decrease due to the Project, as the net influx of temporary workers will be minimal and there is sufficient temporary accommodation in the Fort Saskatchewan area, and due to the relative size of the expansion of the existing Strathcona Salt Cavern Storage Facility. Property values are anticipated to align more with general economic and hiring activity in the AIH and are not expected to be influenced by individual projects of this scale. Effects on the local economy due to construction and operational employment are discussed in Table 17 of Appendix B.

The proposed Project is expected to result in four additional full-time operators and an increase in temporary work during the construction period. Full-time operators would be power engineers (fourth class). Where possible, AES will source construction personnel from the local area. Some temporary specialist positions may be filled from outside the region if they cannot be filled locally. During operation of the project, AES will require additional contractor support and will source required contractors from the local area where practicable.

During construction, ATCO expects to employ a total of 400 to 450 contractors over a period of two and a half years. At peak construction, ATCO expects approximately 175 to 200 contractors to be onsite and this would last for up to one year. Throughout the remainder of the construction phase, direct construction jobs are expected to reach daily totals of 60 to 150. These direct jobs will be made up of a variety of skilled labour including welders/fitters, electricians, millwrights, scaffolders, civil works operators, specialty equipment providers, drillers, pipeline contractors, fabrication shops, and supervisory or inspection related jobs. Almost all of these jobs are expected to be 10- to 12-hour day shifts. Labour for construction of the project facilities is expected to be primarily sourced locally.

Approximately 50 jobs that are indirectly related to project construction are expected to be created. These jobs would include but not be limited to jobs at material and equipment vendors, fire marshals, gas co-ops, municipal governments line locators, gravel pit operators and similar services. Labour for these indirect construction activities is also expected to be sourced locally and be largely existing. In addition, jobs related to engineering and design work for the Project will be created. Approximately 100 engineering and design contractors are expected to be utilized for the project. These jobs will be sourced regionally or elsewhere within the province of Alberta.



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Induced employment is expected to arise in areas such as hospitality (restaurants and hotels for engineering and design contractors or AES employees visiting the project site). Additional AES employees, either temporary or permanent, may also be hired to support the execution of the Project. Due to the relatively small workforce required for this project as compared to other Projects developed in the area, the possibility of a boom-bust cycle in the local economy as the Project moves from the construction to the operations phase is unlikely.

The majority of goods and services, and the majority of labour are expected to be sourced regionally. To the greatest extent possible, labour will be sourced from surrounding communities. AES will support hiring of qualified personnel from the regional area and support regional procurement where practicable. AES will support and prioritize employment and procurement opportunities for qualified Indigenous candidates and will review opportunities to support training of interested candidates. AES' hiring policies are also inclusive of vulnerable populations.

For construction activities, AES will follow its existing supply chain management procedures which include ensuring contractors and suppliers have been approved, are preferred on the basis of safety, environmental and social history and experience, and have positive records of accomplishment. Selection criteria also include the ability, facilities and personnel to produce the required equipment, material or services to an acceptable quality standard, the correct expertise, and an ability to meet the required schedule and cost constraints. Local and / or Indigenous Affiliated Vendors are encouraged to participate in the competitive bid processes for material and services.

As part of the contractor selection process, a review is undertaken of contractor bidders' financial status, openness to various contracting terms, availability, experience and history of executing projects of this size and nature, health and safety, and any other general information about their organization. Upon issuance of the RFPs for the required work, project commitments for inclusion will be identified and will include factors such as potential involvement of Indigenous groups, GBA, and local content when feasible.

Permanent jobs will be posted to the ATCO website and kept up for a period of several days or weeks. Depending on the skill requirements for the job, the posting may be kept open until a suitable candidate is found. The jobs will also be posted to job boards to promote the employment and uplift of diversity. These boards include job boards specific to women in oil and gas, and boards like Working Warriors, which is a job board for Indigenous workers in Canada. Hiring needs will be identified and AES is open to reviewing opportunities for working with interested members of Indigenous Communities who wish to work with ATCO but may require additional training. Procurement opportunities will be discussed with interested Indigenous Communities who will be able to forward job postings or Requests for Proposals to appropriate personnel within the community.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## PART E: FEDERAL, PROVINCIAL, TERRITORIAL, INDIGENOUS AND MUNICIPAL INVOLVEMENT

### 16.FINANCIAL SUPPORT FROM FEDERAL AUTHORITIES

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*DPD Criteria*

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*A description of any financial support that federal authorities are, or may be, providing to the project.*

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The Project will be fully funded by the proponent and does not include any proposed or anticipated federal financial support.

### 17.USE OF FEDERAL LANDS FOR PROJECT

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*DPD Criteria*

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*A description of any federal lands that may be used for the purpose of carrying out the project.*

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

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 18. JURISDICTIONS THAT HAVE POWERS, DUTIES OR FUNCTIONS IN RELATION TO AN ASSESSMENT OF THE PROJECT'S ENVIRONMENTAL EFFECTS.

*A list of any jurisdictions that have powers, duties or functions in relation to an assessment of the project's environmental effects.*

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### *DPD Criteria*

*A list of the **permits, licences or other authorizations that may be required by jurisdictions that have powers, duties or functions in relation to an assessment of the project's environmental effects.***

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In addition to the current IAAC process under the Impact Assessment Act, the proposed Project will be subject to required authorizations and approvals issued by the Alberta Energy Regulator (AER) under the *Oil and Gas Conservation Act* (OGCA), the *Pipeline Act*, the *Environmental Protection and Enhancement Act* (EPEA) and the AER and Alberta Environment and Parks (AEP) under the *Water Act*. The Project will also require permitting from Strathcona County under the *Municipal Government Act*.

As stated above, the AER is the primary regulator of the Project.

### **Permits, Licences and Other Authorizations**

The following permits, licences or authorizations are required, by the identified jurisdictions, in relation to the assessment and regulation of the Project's environmental effects:

- OGCA and *Pipeline Act* requirements under *AER Directive 056: Energy Development Applications and Schedules for the development of energy related infrastructure including wells, facilities and pipelines* (AER 2019). Licences will be required for the cavern and disposal wells, product handling facility and pipelines:
  - For the well licences, compliance to OGCA and the requirements set out in *Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging, and Testing Requirements* (AER 1994) including depths, formation, injection substance and emergency planning zones, if relevant.
  - For facility licences, compliance to OCGA, and the requirements of the following AER Directives:
    - *AER Directive 036: Drilling Blowout Prevention Requirements and Procedures* (Directive 036; AER 2019)
    - *AER Directive 038: Noise Control* (Directive 038; AER 2007)
    - *AER Directive 058: Oilfield Waste Management Requirements for the Upstream Petroleum Industry* (Directive 058; AER 2006)
    - *AER Directive 060: Upstream Petroleum Industry Flaring, Incinerating and Venting* (Directive 060; AER 2020)

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

- For pipeline licences, compliance to the *Pipeline Act (GoA 2020c)*, *Pipeline Rules (GoA 202)* and to *CSA Z662-19 Oil & Gas Pipeline Systems (CSA 2019)*, which set requirements for the safe design, construction, operation and maintenance of regulated pipelines, and regulate substances conveyed, pipeline specifications, and pipeline locations. The AER has also integrated several AER directives, information letters, interpretive documents, and reference tools into a single document, *Directive 077: Pipelines – Requirements and Reference Tools (AER 2011)* to supplement the *Pipeline Act*, *Pipeline Rules*, and *CSA Z662*.
- Cavern mining scheme approval, as per OGCA requirements, for approval of the salt cavern mining program. Approval of a mining scheme includes, but is not limited to the following requirements, for environmental protection and safe operation during mining activities:
  - Sonar surveys at least once every year during mining
  - Continuous protection of cavern roof and production casing while mining
  - Restriction on exceeding 80% of formation fracture pressure
  - Requirement that caverns be developed a minimum of 100 metres away from the edge of mineral rights
  - Completion of a geomechanical study
- Cavern storage scheme approval, as per OCGA requirements, for approval of salt cavern operations. Approval of a storage scheme includes (but is not limited to) the following requirements, for environmental protection and safe operation of the cavern facilities:
  - Results of cavern and wellbore testing, including mechanical integrity testing to validate and prove integrity of caverns and containment, cement bond logs, casing integrity logs, and other tests. These tests also establish base line conditions, which are monitored over the life of the wells and caverns.
  - Submission and approval, prior to operation, of an Emergency Response Plan in accordance with AER Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry (AER 2017)
  - Compliance with *CSA Z341.2-18 Storage of Hydrocarbons in Underground Formations (Salt Caverns) (CSA 2018)*, which sets out minimum requirements for the design, construction, operation, maintenance, abandonment, and safety of hydrocarbon storage in underground salt caverns and associated equipment. This includes specifically the obligation to operate and test the caverns in accordance with the Standard, and subsequent amendments. The Standard also provides provisions for inventory verification, cavern dimension monitoring, and subsidence monitoring.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

- EPEA Approval to construct, operate and reclaim the brine pond, (and associated facilities) to be issued by the AER under the Industrial Approval Application (Activities Designation Regulation). EPEA is the primary Act in Alberta through which regulatory requirements for air, water, land, and biodiversity are managed and governs the lifecycle of the project. AES holds EPEA Approval 357248-00-01 for the existing Strathcona Salt Cavern Storage Facility and will amend the Approval for the proposed Project. EPEA Approval 357248-00-01 was issued based on an evaluation of proposed design and management of the brine pond and associated infrastructure or facilities, and prescribes requirements, including monitoring, sampling, and reporting, for:
  - Flare/air stack heights and identification of permitted air effluent streams.
  - Erosion and Sediment Control Plan implementation and effectiveness.
  - Groundwater dewatering system monitoring and reporting parameters
  - Land conservation, soil monitoring and revegetation including soil salvage and conservation, stockpiling, soil handling, and revegetation requirements.
  - Groundwater management and monitoring, including development of a Groundwater Monitoring Program that characterizes the surface water drainage and hydrogeologic interpretation of the Project sites, a map of proposed and existing groundwater monitoring wells, and parameters to be monitored, including monitoring frequency and requirements for monitoring reporting.
  - Stormwater management and monitoring, including reporting frequencies and requirements.
  - Industrial runoff management and monitoring including monitoring frequency and parameters, and reporting requirements.
  - Wetland monitoring of the existing Wetland W3 in accordance with the approved Wetland W3 Monitoring Program. If required, the Wetland W3 Monitoring Program will be revised in accordance with the requirements of EPEA Approval 357248-00-01, as amended.
  - Soil monitoring and management including Soil Monitoring Program requirements and parameters.
  - Decommissioning Plans and Land Reclamation Plans.
- Water Act Approval for the purpose of constructing a brine pond pursuant to the *Water (Ministerial) Regulation* and the *Dam and Canal Safety Directive* which provide enforceable requirements for the full lifecycle of dams in Alberta.
- Water Act Approval for the purpose of dewatering beneath the brine pond pursuant to the *Water (Ministerial) Regulation*.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

- To construct the product pipelines, the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body*, made under the *Water Act* and *Water (Ministerial) Regulation*, must be followed which establishes the requirements and conditions to be met when undertaking the activity of constructing or removing a pipeline watercourse crossing to eliminate or minimize any potential for harmful effects of pipeline watercourse crossings activity. Compliance to and enforcement of the requirements under the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* are the responsibility of AER.
- Development Permit requirements administered by Strathcona County and the Municipal Development Plan, under the Municipal Government Act for the surface facilities associated with the Project, including the product handling facilities, brine pond and brine pumphouse. Development Permit requirements for Strathcona County include, but are not limited to:
  - Approval of site grading and elevation plans, stormwater management plans, and erosion and sediment control plans
  - Approval of landscaping plans, tree inventories and clubroot management plan
  - Review of baseline reports (e.g. Soil baseline reports)
  - Engineering and Design Review and approval (including plot plan, civil, structural, electrical, utilities)
  - Geotechnical investigation review and approval
  - Development of a Fire Protection strategy and Risk Assessment Study
  - Access road use agreements and traffic impact assessments.
- The development of the brine disposal well will require Approval under AER *Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging and Testing Requirements* (AER 1994). The licences for AES' brine disposal wells are held under AER Class II Disposal Approval 7900C, as amended. The Disposal Approval will be amended to add an additional well to the Disposal Approval.
- A *Historical Resources Act* (HRA) Application will be submitted to Alberta Culture, Multiculturalism, and Status of Women (Alberta Culture) for approval under the *Historical Resources Act*. The proposed Project will be developed on the same lands as the existing Strathcona Salt Cavern Storage Facility, with potential for development on the northern portion of NW 27-55-23 W4M and Lot D in NW 34-55-21 W4M. AES applied for and obtained HRA Approval for the existing facility on SW 34-55-21 W4M prior to beginning construction on the Strathcona Salt Cavern Storage Facility. During construction, no historical resources were encountered.

As HRA Approval is related to development, AES will obtain appropriate clearance for the final Project footprint, including amendment to its existing HRA Approval for SW 34-55-21 W4M, any portion of NW 27-55-23 W4M or Lot D NW 34-55-21 W4M required for the Project, and the final NGL pipeline route. AES will follow all guidance and requirements from Alberta Culture prior to commencing construction. In the event a historical resource is discovered during the course of Project activities, AES will follow the Standard requirements under the *Historical Resources Act: reporting the discovery of a historic resource* (Alberta Culture 2019). AES will also develop a protocol for the discovery of a historical, cultural, or paleontological resource for the Project, including notification to Indigenous Communities.

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- A Pre-Consultation Assessment Request will be submitted to the Alberta Aboriginal Consultation Office (ACO) for their consultation intensity recommendation for the Project as the Project requires an amendment to EPEA Approval for the brine pond. Once a response is provided, AES will follow the recommendation of the Government of Alberta.

No new approvals or licences will be required to operate AES' existing facilities that will be used to support development of the proposed Project. Existing approvals and licenses that will be used as part of the proposed Project include:

- AES' existing Water Act Approval 356745-00-00 for its water intake on the North Saskatchewan River
- AES' Water Act Diversion Licences. AES currently holds Water Act Licence 00346745-00-00 for the purpose of cavern solution mining and Water Act Licence 31016-00-04 for the purposes of industrial processing. No additional volumes and no changes in withdrawal rates will be required for the proposed Project.
- AES' existing Disposal Well Scheme Approval, approved as per the requirements of the Oil and Gas Conservation Act and AER Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging and Testing Requirements (AER 1994). AER Class II Disposal Approval 7900C, as amended, is held for AES' existing brine disposal scheme.

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

## Monitoring and Inspection Requirements

The Project will be subject to monitoring and inspection requirements as prescribed in applicable legislation and guidelines, and regulatory approvals for the Project issued by the AER, AEP and Strathcona County. Expected and planned monitoring and inspection activities are described below. Construction and operations monitoring commitments made in the SA in Appendix B to monitor effectiveness of mitigation measures are also summarized.

The monitoring and inspection programs that AES will undertake as part of the proposed Project include construction, post-construction, and operational activities throughout the lifecycle of the Project. Monitoring will also be required post-decommissioning. Regulatory monitoring, inspection and reporting requirements that apply to the existing Strathcona Salt Cavern Storage Facility are expected to be amended for the proposed Project.

## Construction and Post Construction:

The following plans will be developed to ensure required and appropriate inspection and monitoring activities will be conducted during and post-construction.

- Erosion and Sediment Control (ESC) Plan that will be based on soil erodibility, vegetation cover, topography and climate, will appropriately divert and direct runoff, including installation of sediment barriers, and include construction specific procedural requirements. The ESC Plan will:
  - Comply with the requirements of EPEA (GoA 2020a) and regulations, the *Water Act* (GoA 2017), and the *Water (Ministerial) Regulation* (GoA 2020e) to prevent erosion and sedimentation;

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- Comply with existing site approval under the *Water Act* (GoA 2017) for utilizing Wetland W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion; and
- Comply with Strathcona County requirements for an ESC Report for construction activity.
- Stormwater Management Plan (SWP) that will be specific to the Project and include specific measures that will be undertaken to effectively manage drainage. The SWP will:
  - Comply with the requirements of EPEA (GoA 2020a) and regulations, the *Water Act* (GoA 2017), and the *Water (Ministerial) Regulation* (GoA 2020e).
  - Comply with existing site approval under the *Water Act* for utilizing W3 as a stormwater management facility
  - Comply with the EPEA Approval requirements and any associated amendments for the proposed Project
- Groundwater Management Plan (GMP), that will be specific to the Project and be developed in accordance with the requirements of the existing EPEA Approval (refer to section 4.5.1 of the Approval in Appendix D) and Water Act (Dam Safety) Approval. The GMP will:
  - Comply with the requirements of EPEA (GoA 2020a) and regulations, the *Water Act* (GoA 2017), and the *Water (Ministerial) Regulation* (GoA 2020e).
  - Comply with existing site approval under the *Water Act* for utilizing W3 as a stormwater management facility
  - Comply with the existing EPEA Approval requirements and any associated amendments for the proposed Project, and new Water Act (Dam Safety) Approval required for the Project
- Water Management Plans for groundwater dewatering (as per the required *Water Act* Approval) to address water quality and quantity and stormwater/snowmelt management during construction activities, and the pipeline ROW (to address hydrostatic testing of the pipeline).
- Annual Performance Report, submitted to the AER as part of the Water Act (Dam Safety), required while the brine pond is under construction and during the post-construction period until the pond becomes operational);
- Site Preparation control plans will be developed to address survey and flagging, vegetation clearing, soil salvage and stockpiling, and timber and brush disposal
- Air Emissions control plan to address emissions from construction equipment (e.g., idling), dust, and odour control.
- Vegetation Management control plans to address clubroot management and management of other weed communities.



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- Waste Management Plan to address waste management procedures including site set up and assignment of waste coordination duties, material handling, communication, specific practices for non-hazardous materials, hazardous materials and petroleum products, and waste manifesting.
- Traffic Management Plan to address access to construction areas and ensure safety of Project personnel, the public, and wildlife through safe transport of materials and personnel.
- Cleanup and Reclamation plans to address removal of construction materials (e.g., flagging), clean up, re-contouring, and revegetation. The pipeline ROW Environmental Protection Plan (EPP) will also address subsoil decompaction, subsoil and topsoil placement, bank stabilization (where relevant), and revegetation.
- Environmental Inspection plans, which will detail the duties of the Environmental Inspector, the requirements of environmental inspections, and the details to be included in environmental inspection reports.
- Post-Construction Monitoring (in accordance with EPEA Approval 357248-00-01) to define the key post-construction monitoring activities, the parameters, duration after construction, frequency, timing, and measurements or observations to be captured.

AES will also develop Environmental Alignment Sheets (EAS) and access and construction maps (ACM). The EPP will be read in conjunction with the EAS and ACM.

- EAS will be prepared for the pipeline ROW. EAS provide information on the pipeline ROW's environmentally sensitive features, land ownership, and land use along the pipeline ROW. Environmental concerns and their corresponding environmental protection and mitigation measures will be indicated in the EAS.
- ACM will identify potentially sensitive features at the Project Site. The purpose of these maps is to identify sensitive features and implement avoidance measures. If avoidance is not practicable, AES will implement mitigation measures identified in the environmental control, contingency, or management plans as required.

Contingency plans will be developed to address potential events that may occur during construction and provide guidance to mitigate potential effects as a result of the event or discovery. These contingency plans consider the requirements of applicable legislation including EPEA, OGCA and Regulations, *Pipeline Act*, and the HRA. Contingency plans provide field-level guidance and follow up, including notification of applicable regulatory bodies and commitments made by AES to develop further mitigation measures or implement management plans that are site-specific to the event or discovery. Contingency plans that will be developed for the proposed Project include:

- Spill Prevention and Containment Contingency Plan – this plan will address prevention, containment, and reporting procedures for spills. This control plan will also state the minimum amount of spill containment materials that will be available in the event of a spill.
- Archaeological, Cultural, and Paleontological Resource Contingency Plan – this plan will address the measures to be taken to conserve and protect a suspected archaeological, cultural, or paleontological resource that may be uncovered during construction activities in accordance with applicable law. This plan will include the plan to inform and involve interested Indigenous Communities of the resource.

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- Wildlife Features of Concern Contingency Plan – this plan will address contingency measures in the event a wildlife feature of concern (e.g., hibernacula, burrow) is discovered as part of construction activities.
- Key Wildlife and Biodiversity Zone Plan: If any construction work is required in the KWBZ during the restricted activity period, AES will retain a Resource Specialist to prepare a KWBZ Protection Plan and submit it to AEP for review and written approval by the Director prior to commencing any works in the KWBZ.
- Soil Handling Contingency Plan – this plan will address soil handling measures in the event that soil handling must occur in sub-optimal (e.g., frozen) conditions.
- Construction Site Fire Safety Plan – this plan will be developed as required by Strathcona County

Additional monitoring and inspection will occur as required. AES will respond immediately to any stakeholder complaints received during construction of the Project (e.g., noise complaint). AES and its contractors will work with the affected stakeholder to develop a plan to address and manage the complaint (e.g. noise monitoring).

AES will develop and implement an Environmental Protection Plan (EPP) to guide the construction phase of the proposed Project to ensure that mitigation measures are documented, consistent, and easily referenced by all Project personnel. The EPP will be certified by the applicable contractors and will prescribe planned measures for mitigating the effects and potential effects of construction activities. The EPP will be developed in accordance with EPEA and other applicable requirements and will consolidate policies and procedures, safe work practices, environmental control plans, environmental contingency plans, environmental management plans, and a construction site fire safety plan. Roles and responsibilities of AES, contractors, and sub-contractors responsible for achieving compliance with the EPP will also be defined. The EPP will be site-specific and developed in consideration of the needs of the Project and will be finalized as the Project nears construction.

AES will review approval conditions, environmental management plans, and any other planned protective or mitigative measures with the applicable contractor(s) prior to start of construction, will monitor compliance to these plans over the construction period and will evaluate construction mitigation measures implemented by the contractor to ensure they are effective.

Refer to inspection and monitoring activities discussed with Mitigation Measures as part of Section 4 of Appendix B for additional details on construction and post-construction inspection and monitoring activities.

## Operations:

The majority of inspection and monitoring performed during operations will be prescribed by applicable legislation and regulatory approvals for the Project.

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AES currently holds EPEA Approval 357248-00-01, as amended. This approval was issued on June 24, 2015 and permits AES to construct, operate, and reclaim the Strathcona Salt Cavern Storage Project (now known as the Strathcona Salt Cavern Storage Facility) and associated Brine Storage Pond. The terms and conditions of the EPEA approval apply to the Project from start of construction to completion of remediation and reclamation. EPEA Approval 357248-00-01 is provided in Appendix D. Under EPEA Approval 357248-00-01, as amended, AES is required to develop and implement the following:

- **Industrial Wastewater Control System:** AES has a groundwater collection system under the existing brine pond, and it is anticipated that a similar system would be employed should AES choose to proceed with a brine storage pond for the proposed Project. AES is required to collect and test groundwater collected in this system for chlorides, and may only release it to designated areas. AES will be required to collect flow and chloride concentration parameters on defined frequencies and provide an annual report.
- **Groundwater Dewatering System:** AES holds a Water Act Approval to divert groundwater from under the brine pond during operational activities. When this system is in use, AES will be required to collect discharge volumes, routine and major ions, and metal parameters and provide an annual report.
- **Groundwater and Wetland Monitoring:** AES has an approved Groundwater and Wetland Monitoring Program that fulfills the terms and conditions of EPEA Approval 357248-00-01, as amended. Groundwater sampling is currently conducted semi-annually (spring and fall). It is anticipated that this approved Groundwater and Wetland Monitoring Program will be amended and implemented for the Project.
- **Soil Monitoring Program:** AES has an approved Soil Monitoring Program that fulfills the terms and conditions of EPEA Approval 357248-00-01, as amended. Soil Monitoring is done on a five-year frequency and it is anticipated that this frequency will be the same for the Project. The parameters for soil sampling are salinity, total organic carbon, cation exchange capacity, texture and particle size analysis, trace elements, and elemental sulphur. It is anticipated that this approved Soil Monitoring Program will be amended and implemented for the Project.
  - EPEA Approval 357248-00-01, as amended includes terms and conditions for a Soil Management Program if the Soil Monitoring Program reveals that there are substances present in the soil at concentrations greater than any of the applicable concentrations set out in the standards in the *Soil Monitoring Directive* (AEP 2009). AES has not had to develop a Soil Management Program as the monitored parameters have not exceeded the concentrations set out in the *Soil Monitoring Directive* (AEP 2009).

The groundwater, wetland, and soil monitoring programs are site-specific and were developed to meet terms and conditions defined in EPEA Approval 357248-00-01, as amended. Each monitoring plan or program was approved by the AER prior to commencing the monitoring programs. To date, the AER has had no concerns with the established monitoring programs. AES expects that these existing programs would be reviewed and modified to accommodate the facility expansion and operation. If monitoring suggests that further investigation is required, AES will develop additional mitigation and monitoring plans and will work with the AER to define the requirements of these plans and any adjustments to future inspection, monitoring and reporting.

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The following management plans were also approved as part of AES' existing EPEA Approval 357248-00-01. AES expects these plans will be amended and updated to account for the Project:

- **Stormwater and Groundwater Management Plan:** This plan includes measures to address on-site and off-site drainage for the development. This plan is the basis for the existing stormwater and groundwater management facilities on the Project site. AES will develop an updated version of this plan to account for the additional surface facilities and construction of additional stormwater management facilities.
- **Erosion and Sediment Control Plan:** The Stormwater and Groundwater Management Plan also included a conceptual erosion and sediment control (ESC) plan. AES plans to submit a comprehensive ESC Plan as part of provincial applications for the Project. Implementation of the ESC Plan is anticipated to be an approval condition of EPEA Approval 357248-00-01, as amended.

A Dam Safety Management Plan and Operations, Maintenance and Surveillance (OMS) Manual is in place for the existing brine pond and will be updated for the new brine pond, for duration of its operation. This Plan and Manual are developed in accordance with the *Dam and Canal Safety Directive* (AER 2018) and include various inspection and monitoring requirements and activities conducted by AES employees, the Engineer of Record, or other qualified third parties, including:

- Routine inspection activities, of brine pond berms and inclinometers, operating equipment and meters, pond operating levels, groundwater dewatering equipment and monitoring systems, erosion and sediment control systems and Wetland W3;
- Routine surveillance activities for monitoring brine pond, pumphouse and liner system integrity, quality and quantity of site groundwater and Wetland W3, groundwater dewatering and soil monitoring;
- Formal engineering inspections, conducted every 12 months by a qualified professional and submitted to the AER;
- Comprehensive Dam Safety Review, conducted every 10 years by a qualified third party (not the Engineer of Record); and
- Should a deficiency be found over the course of operations, Annual Performance Reports completed and submitted to the AER, until the deficiency has resolved.

Alternatively, if a brine tank storage system is selected, AES will conduct inspection and monitoring as per the terms and conditions of the Alternative Storage Approval under AES *Directive 055: Storage Requirements for the Upstream Petroleum Industry* and any additional terms and conditions of associated amendments to EPEA Approval 357248-00-01.

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AES currently follows and maintains Asset Integrity Programs for its wells, pipelines, and pressure equipment as required under applicable AER legislation:

- AES maintains a Well and Subsurface Integrity Program, a Pipeline Integrity Program and a Pressure Equipment Integrity Program and will update these programs to incorporate the new assets associated with the Project.
- These programs are required by the AER under OCGA and Regulations, and Pipeline Act and Regulations and ABSA. The Well and Subsurface Integrity Program was developed in compliance to *CSA Z341.2-18 Storage of Hydrocarbons in Underground Formations* (CSA 2018). The Pipeline Integrity Program was developed in compliance with *CSA Z662-19 Oil and Gas Pipeline Systems* (CSA 2019).
- These programs comply with prescribed inspection and monitoring requirements (e.g. well casing integrity inspections, annual pipeline inspections) and are reviewed and updated at least every three years for continual improvement.

AES also has an integrated organizational management system which prescribes requirements for the ongoing continual improvement of integrity, maintenance, inspection and monitoring programs and activities, and a formal review of effectiveness at least every three years. In particular, the AES management system provides requirements for training and record retention associated with the listed activities.

Any results of inspection and monitoring activities will be addressed in accordance with regulatory or approval requirements, or otherwise as per internal AES procedures to ensure the adequate corrective or preventive action is taken.

AES is not required to perform any air monitoring for the existing Strathcona Salt Cavern Storage Facility and does not anticipate any air monitoring requirements for the Project. Outside of the emissions from the flare pilots which are negligible, there are no continuous emissions associated with the operations phase of the Project.

Refer to inspection and monitoring activities discussed with Mitigation Measures as part of Section 4 of Appendix B for additional details on operating inspection and monitoring activities.

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## PART F: POTENTIAL EFFECTS OF THE PROJECT

### 19. POTENTIAL EFFECTS ON FISH AND FISH HABITAT, AQUATIC SPECIES AND MIGRATORY BIRDS

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#### *DPD Criteria*

A **description** of any changes that, as a result of the carrying out of the project, may be caused to the following components of the environment that are within legislative authority of Parliament:

- fish and fish habitat, as defined in subsection 2(1) of the [Fisheries Act](#);
- aquatic species, as defined in subsection 2(1) of the [Species at Risk Act](#); and
- (migratory birds, as defined in subsection 2(1) of the [Migratory Birds Convention Act, 1994](#).

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#### **Fish and Fish Habitat**

No measurable or adverse effect on fish and fish habitat is predicted as a result of the Project. The potential for effects to fish and fish habitat from the construction and operation of the proposed Project are discussed below and assessed in Section 4 of Appendix B.

There are no fish bearing waterbodies or watercourses present on the Project site, however the proposed pipeline ROW will cross Astotin Creek, which may support forage fish. Fish inventories of Astotin Creek have shown presence of small-bodied fish, including brook stickleback (*Culaea inconstans*), fathead minnow (*Pimephales promelas*), and one large-bodied fish, white sucker (*Catostomus commersonii*; FWMIS 2021). No sport fish have been reported and Astotin Creek is not stocked (FWMIS 2021). No benthic invertebrate surveys for Astotin Creek are available for public review.

Two pipelines will extend up to 5 kilometres outside of the Project site to convey product to and from customers. The pipelines will parallel existing pipeline routes extending to the west and south of the Project site. The pipeline ROW is expected to traverse Astotin Creek and a number of wetlands, including ephemeral waterbodies, marshes, shallow open water, and swamp wetlands. AES plans to Horizontally Directionally Drill (HDD) below Astotin Creek and any Crown claimed wetlands to prevent disturbance of wetlands which could affect groundwater recharge or surface water availability, or potential damage to the bed and banks of the watercourse and wetlands. Crossing design will consider technical and environmental considerations. Some wetland crossings are expected to be trenched. Trenching will be conducted in accordance with the requirements of the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (GoA 2013). This Code of Practice requires signed and stamped crossing designs and an evaluation of the crossing by a Qualified Aquatic Environmental Specialist. Appropriate erosion and sediment control measures will be used during construction of the pipeline ROW. AES will engage a qualified wetland specialist to complete a Wetland Assessment Impact Form (WAIF) prior to submission of a Code of Practice Notification when trenching pipelines through a wetland.

AES will take care to design wetland and water body crossings to preserve existing catchment and prevent impacts to the bed, banks, and riparian areas to the extent practicable. AES will develop a horizontal directional drill frac-out contingency plan and review it with the drilling contractor prior to drilling the crossing of Astotin Creek. Experienced contractors will be engaged to construct any directionally drilled or trenched water body crossings. Water body crossings will not be constructed until appropriate supporting documentation has been developed and submitted to the AER in accordance with Code of Practice Notification Requirements.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

The proposed Project is located in the Beaverhill subwatershed of the North Saskatchewan River (NSWA 2021). Although average annual precipitation is generally high in the region, most precipitation occurs between May and September, when potential evapotranspiration is as large as 450 millimetres. As a result, there is generally little surface runoff. Spring snowmelt is one of the most important contributors to local runoff to wetlands (Ameli and Creed 2017). Subsurface connectivity modeling completed by Ameli and Creed (2017) suggests that subsurface connectivity exists between the North Saskatchewan River and wetlands up to 30 kilometres away. The wetlands within the Project site are recharge wetlands, located approximately 4.5 kilometres (south south-east) from the North Saskatchewan River. These recharge wetlands and other wetlands up to 30 kilometres away account for a monthly groundwater contribution of  $0.775 \times 10^6 \text{ m}^3$  to the North Saskatchewan River (Ameli and Creed 2017). Surface connectivity between wetlands around the Project site and the North Saskatchewan River was observed during the period of April 1 to August 1, 2013, when the largest net surface water fluxes occurred since the year 2000. During this time, surface connections between wetlands and the North Saskatchewan River ranged from 50 metres to 8 kilometres from the banks of the river (Ameli and Creed 2017). Impacts to fish and fish habitat through hydrologic connectivity between wetlands, the North Saskatchewan River, and tributaries of the North Saskatchewan River are not expected, as surface connectivity is low in most conditions and recharge mainly occurs through shallow groundwater infiltration. As noted in Section 14, there is no direct connection between Astotin Creek and Wetland W3.

Most surface water connectivity will actually occur through low shallow groundwater transmission with very limited surface flow to waterbodies outside of the Project site. No impacts to fish and fish habitat as a result of surface runoff are anticipated as runoff water collected in the wetlands and stormwater management facilities for the Project site is expected to stay on the Project site. No runoff will be released to the environment until it has met the EPEA parameter/concentration limits. Typical parameters for industrial runoff are pH, oil and grease, total suspended solids, chemical oxygen demand, ammonia nitrogen, and chloride. Presently, AES is required to monitor for chloride levels and expects that, at minimum, an amendment to EPEA Approval 357248-00-01 will require similar parameters. Runoff that does not meet these parameters or concentration limits will be stored on site and disposed of at a licensed facility.

The general direction of surface drainage in the area surrounding the Project is to the northeast, toward Astotin Creek. Within the Project site approximately 87.7 hectares of the surrounding topography drains into Wetland W3 (Associated Engineering 2020). Water directed to the wetland is generally surface drainage after snowmelt or a precipitation event. Water will enter the wetland through the vegetated fringe surrounding the wetland, slowing the introduction of any suspended solids in Wetland W3 during a runoff event.

Due to the large amount of storage available in the wetland, it is expected to be isolated most of the time and connection of the wetland to the northwest of the Project site is expected to be very infrequent or to not happen at all. Discharge from Wetland W3 in SW 34-55-21-W4M to the neighbouring wetlands 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 boundary of W3. The typical mechanism of drawdown of the wetland is infiltration and evaporation. In the unlikely event that enough runoff accumulates during a major precipitation event (i.e. greater than 1 in 100-year volumes) which could connect the on-site wetland with Wetland W1, flows could eventually make their way north to Astotin Creek through a series of wetlands (Stantec 2014b). AES has an existing Stormwater and Groundwater Management Plan approved under EPEA Approval 357248-00-01, as amended, and would implement approved methods to reduce levels in Wetland W3 if the water level in Wetland W3 began to exceed 621.2 masl.

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However, AES will manage the water level in Wetland W3 to the elevation approved in the existing Stormwater and Groundwater Management Plan, approved under EPEA Approval 357248-00-01, as amended. The Stormwater and Groundwater Management Plan allows AES to implement mitigation measures to eliminate the potential of Wetland W3 discharging to neighbouring wetlands. During wet conditions, if the high-water level in Wetland W3 is greater than expected, a pump will be used to draw down the water level, and the water will be managed as per EPEA Approval 357248-00-01, as amended for the proposed Project. Overland discharge from Wetland W3 to the adjacent environment is not expected. The existing general drainage path will be maintained for the offsite areas. These naturally drain towards the onsite Wetland W3, and it is important not to deplete the wetland.

The stormwater management facility will be monitored, and performance evaluated as per EPEA Approval 357248-00-01, as amended, and *Water Act* approval conditions required for the Project. Reporting on the stormwater and groundwater management activities will be completed as per EPEA Approval 357248-00-01, as amended.

The catchment area of Wetland W3 has increased approximately 23% since the wetland assessment of Wetland W3 was completed in 2013 to support development of the existing Strathcona Salt Cavern Storage Facility (Associated Engineering 2020). This increase is largely attributed to drainage from a ditch paralleling Range Road 213 flowing toward the wetland. This does not impact the future grading and contouring that will occur as a result of the Project (Tang 2021). Additionally, when considering climate change resiliency, the Prairie Climate Centre models project higher extreme rainfall events as well as persistent annual rain (Associated Engineering 2020). This prediction of higher extreme and persistent rainfall aligns with observed conditions and general trends at the existing site. An increase in rainfall events is predicted to contribute to an existing high groundwater table in the area, which would limit surface water levels from subsiding (Associated Engineering 2020).

AES monitors Wetland W3 levels as part of its existing operations and has the ability and authorization to divert water from the wetland prior to any potential for impact from high water levels and to prevent any flows from Wetland W3. AES is evaluating other methods to divert water from Wetland W3 and is also evaluating implementation of additional stormwater management facilities as part of ongoing operations and in support of the Project, including a runoff pond for the product handling facility and cavern well pad area. Expansion into NW 27-55-21-W4M (i.e., if the south brine pond or south product handling facility is selected) would include development of a stormwater management pond including controls to allow for testing prior to release of site water. These additional measures will provide AES with several options to reduce the level of Wetland W3 during extreme or persistent rainfall events and largely eliminate the possibility of stormwater from the Project site entering Astotin Creek. It is predicted that water impounded and released on site would eventually enter Astotin Creek through shallow groundwater infiltration, which is a long-term process that would remove any potential constituents of concern. Due to the lack of contaminants on site and stormwater management mitigation measures, there are no predicted adverse effects to Astotin Creek or to fish and fish habitat as a result of surface water inundation.

No measurable residual effect is predicted to wetland function outside of the Project site. If the optional area in NW 27-55-21-W4M is selected, site preparation, grading, and facility placement may directly affect the temporary-to-ephemeral and seasonal wetlands within the northern 20 hectares of NW 27-55-21-W4M. It is suspected that these wetlands have already been altered due to surrounding cultivation. If these wetlands will be disturbed, AES will engage a Qualified Aquatic Environmental Specialist to complete a field survey and Wetland Assessment and Impact Report in support of a *Water Act* approval prior to completing any Project activities that could directly affect the wetlands. It is predicted that



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the removal or alteration of these wetlands would not have any effect on fish and fish habitat due to the temporary-to-ephemeral and seasonal nature of these wetlands and the lack of connectivity between these wetlands and any fish-bearing water bodies.

Further, introduction of contaminants to Wetland W3 is not anticipated. All process wastes will be stored in appropriate containers and accidental releases of potential contaminants will be prevented by installing appropriate primary and secondary containment. This includes grading the product handling facility site and well pads to an onsite stormwater runoff pond and primary and secondary containment for hydraulic sumps on pumps. The proposed liquid hydrocarbon cavern well will be located on a well pad designed so that any accidental liquid spills would be collected in the product handling facility and well pad stormwater runoff pond. This stormwater runoff pond would be approved by the AER prior to development. Runoff from the stormwater pond would not be released unless it met AEP parameters/concentration limits. AES' existing GWMP on the Project site would ensure that any infiltration of contaminants into the shallow groundwater would be detected and could be remediated immediately and without impacting surface water outside the Project site.

Stormwater in SW 34-55-21-W4M is currently diverted to the existing onsite Wetland W3, and stormwater in NW 27-55-21-W4M will be diverted to a new, approved stormwater management system. A Stormwater Management Plan will be created during detailed design and engineering and approved for any development that occurs on NW 27-55-21-W4M. A substantial portion of NW 27-55-21-W4M is in the catchment area of Wetland W3 (Associated Engineering 2020); however, due to infrastructure placement, Wetland W3 may not be suitable to support drainage in NW 27-55-21-W4M. It is anticipated that drainage in NW 27-55-21-W4M will be managed through the construction of a stormwater management pond and grading of the site. No water will be released from the stormwater pond until it has met EPEA parameters/concentration limits. Typical parameters and concentration limits include limits on chloride content, pH, and presence of a sheen on the collected water. If water was found to exceed any of these parameters, it would be securely stored and then disposed of at a licensed facility.

The potential for chloride contamination from the brine pond is limited by both design measures and monitoring activities. The brine pond will be installed with a double liner and leak detection system to detect leaks from the primary liner, which would be contained by the secondary liner. A series of groundwater monitoring wells and a groundwater recovery system will also be in place. These are discussed in detail in Section 9.

No overflow of the brine pond which could affect surface or groundwater runoff would be generated by a rainfall event. The existing brine pond for the Strathcona Salt Cavern Storage Facility is operated in accordance with the requirements of the existing EPEA Approval, *Water Act (Dam Safety)* Approval and *Dam and Canal Safety Directive* (AER 2018) and the proposed brine pond would be designed, constructed and operated to ensure continued compliance and integrity. The brine pond will be built to a capacity in excess of the maximum amount of brine it would be required to contain. In the event that brine levels began to rise, the brine would be pumped from the pond to the disposal wells to manage the brine level in the pond.

There is no connectivity between the cavern and disposal wells and surface water (i.e. Wetland W3 or other wetlands) in the immediate Project or local areas. All potential hydrocarbon bearing zones or injection and disposal zones outside of the target formations will be isolated by cement casings, as required by the AER. In accordance with the requirements of *Directive 051: Injection and Disposal Wells* (AER 1994) and *CSA Z341 Storage of Hydrocarbons in Underground Formations*

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

(CSA 2018) as applicable, the wells will be isolated from groundwater with an appropriate combination of surface and production casing cemented to surface from a minimum of 25 metres below the lowest usable groundwater zone (i.e. 25 metres below the base of groundwater protection). AES has operated the cavern wells since 2016 and the existing disposal well has been in operation since 1982 with no adverse effects to surface water quality identified as part of ongoing inspection and monitoring. Due to existing design and engineering controls and AES' operational history, no effects to surface water quality in the immediate Project or local areas as a result of drilling or downhole operations are expected. As such, no effects to fish or fish habitat are predicted from these activities.

Alterations to the grade and drainage patterns at the Project site are not expected to alter fish habitat or affect fish and there is no reasonably foreseeable method for onsite sedimentation processes affecting off-site fish and fish habitat. There will be no increase of sedimentation in fish-bearing water bodies as a result of Project activities. AES has well established groundwater, wetland and soil monitoring programs that have been approved by the AER as per the existing EPEA approval. Baselines were developed before the operation of the existing facility (2014) and monitoring continues during spring and fall for groundwater and wetland quality monitoring. Additional details on AES' inspection and monitoring programs under AES' EPEA Approval 357248-00-01 are provided in Section 18.

## Aquatic Species

No measurable or adverse effect on aquatic species is predicted as a result of the Project. The potential for effects to aquatic species from the construction and operation of the proposed Project are discussed below, above under Fish and Fish Habitat, and assessed in Section 4 of Appendix B.

There were no aquatic species, as defined under *SARA*, observed on the Project site during the wetland assessments conducted in 2013 and 2020. Additionally, there is no high suitability habitat for aquatic species as defined under *SARA* in the Project site, given that the land is currently used for industrial purposes. There have been no sensitive aquatic plants observed in Wetland W3 or other waterbodies in the Project site.

The pipeline ROW traverses Astotin Creek, which is a Class C waterbody and is conservatively assumed to be fish-bearing however there are no aquatic species, as defined under *SARA*, that are known to live in Astotin Creek. The pipeline ROW crossing of Astotin Creek will be directionally drilled to eliminate potential effects to the bed and banks of Astotin Creek.

Although no sensitive species have been identified in the Project site or in Astotin Creek, it ultimately drains into the North Saskatchewan River approximately 4.3 kilometres away. The North Saskatchewan River supports habitat for lake sturgeon (*Acipenser fulvescens*), a species that is designated as Threatened under Alberta's *Wildlife Act* and recommended by COSEWIC to be designated Endangered under *SARA*. The designation of Endangered status under *SARA* is pending (GoA 2021b). The lake sturgeon is considered At-Risk by DFO (DFO 2021).

AES will follow the mitigation measures described above relating to Fish and Fish Habitat. Water withdrawals from the North Saskatchewan River will be conducted using AES's existing water intake system and no disturbance to the bed, banks, or riparian vegetation of the North Saskatchewan River is required. Additionally, the construction of the pipeline ROW is not predicted to have a noticeable effect on groundwater recharge or noticeable impacts to the flow rates or levels in the North Saskatchewan River. As such, no effects to aquatic species in the North Saskatchewan River or tributaries of the North Saskatchewan River are predicted.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

No measurable residual effect is predicted to wetland function outside of the Project site. If the optional area in NW 27-55-21-W4M is selected, site preparation, grading, and facility placement may directly affect the temporary-to-ephemeral and seasonal wetlands with the north 20 hectares of NW 27-55-21-W4M. It is suspected that these wetlands have already been altered due to surrounding cultivation. If these wetlands will be disturbed, AES will engage a Qualified Aquatic Environmental Specialist to complete a field survey and Wetland Assessment and Impact Report in support of a *Water Act* approval prior to completing any Project activities that could directly affect the wetlands. It is predicted that the removal or alteration of these wetlands would not have an effect on aquatic species due to the temporary-to-ephemeral and seasonal nature of these wetlands and the lack of connectivity between these wetlands and any fish-bearing water bodies.

AES does not plan to affect or disturb any of the wetlands traversed by the pipeline ROW beyond the temporary disturbance associated with trenched crossings. No effects are anticipated to aquatic species as wetland abundance will not noticeably change and the disturbance associated with construction will be brief in duration and will return to a similar state after construction clean up and revegetation.

Due to the distance from the North Saskatchewan River and lack of surface connectivity between surface water in the Project site and the North Saskatchewan River, no effects to lake sturgeon spawning or feeding grounds are anticipated. Because it is not expected to interact with aquatic life, the Project is not expected to adversely affect aquatic species, as defined under SARA.

## **Migratory Birds**

No measurable or adverse effect on Migratory Birds, as defined in the Migratory Birds Convention Act, is predicted as a result of the Project. Potential effects to migratory birds from the construction and operation of the proposed Project and planned mitigation measures are discussed below and assessed in Section 4 of Appendix B.

No high suitability bird habitat has been identified within the Project site. Four bird species, black-throated green warbler (*Dendroica virens*), Clark's nutcracker (*Nucifraga columbiana*), sora (*Porzana Carolina*), and white-winged scoter (*Melanitta fusca*), have been reported in the Project site during previous wildlife inventories (FWMIS 2021). All four species are considered sensitive in Alberta (GoA 2015). None of the species observed on the site have been assessed by COSEWIC, nor are they listed as Extirpated, Endangered, Threatened, or Special Concern under SARA.

A wetland survey was conducted in the summer of 2020, and no federally (i.e. *Species at Risk Act*) or provincially (i.e. *Alberta Wildlife Act*) protected species were observed in the Project site during the survey, or in a previous survey conducted in 2013. Given that most of the Project site is developed or cultivated with annual crops, there is limited potential for sensitive species to use the Project site (Golder 2020).

It is predicted that migratory birds would preferentially use the vegetated fringe surrounding Wetland W3 or the wetland complexes to the northeast of the Project site along Astotin Creek. No effects to water quality in Wetland W3 are expected, and as such, the proposed Project is not anticipated to adversely affect migratory birds or terrestrial wildlife use of Wetland W3.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

As noted, no measurable residual effect is predicted to wetland function outside of the Project site. If the optional area in NW 27-55-21-W4M is selected, site preparation, grading, and facility placement may directly affect the temporary-to-ephemeral and seasonal wetlands with the north 20 hectares of NW 27-55-21-W4M. It is suspected that these wetlands have already been altered due to surrounding cultivation. If these wetlands will be disturbed, AES will engage a Qualified Aquatic Environmental Specialist to complete a field survey and Wetland Assessment and Impact Report in support of a Water Act approval prior to completing any Project activities that could directly affect the wetlands. It is not anticipated that removal or disturbance of these wetlands would have a measurable residual effect on migratory birds due to the temporary-to-ephemeral, and seasonal nature of these wetlands. As a wildlife sweep will be conducted prior to start of Project clearing activities, no measurable effect to other wildlife that may use these temporary-to-ephemeral and seasonal wetlands is predicted.

The pipeline ROW parallels existing pipelines in the area and traverses an area with surrounding industrial development. Given that the pipeline ROW traverses existing wetland complexes and Astotin Creek, it is anticipated that the pipeline ROW may provide more suitable habitat for migratory birds. Generally, the Project is not anticipated to affect migratory bird survival or reproduction. Construction of the ROW may disrupt nesting activities along the pipeline ROW during the construction period, however the effect will be short in duration and post-construction cleanup and reclamation will occur progressively as each segment of the pipeline ROW is completed.

AES will develop an EPP prior to beginning construction of the Project. The EPP is intended to identify key environmental information and requirements, field instructions, and mitigation measures specific to the construction, post-construction cleanup and remediation of the proposed Project. The purpose of an EPP is to provide guidance to employees and contractors for responsible environmental working procedures and standards during construction. The EPP will also provide contingency plans or instructions to workers in the event that an unexpected event occurs.

The primary mitigation measure 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). 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*. If occupied nests or migratory birds are encountered during construction, AES or its contractors will stop work around the nest or feature, flag the area, and notify a Resource Specialist and/or regulatory agencies as needed. If it is possible to relocate a nest, the nest will be relocated and will be monitored until the end of the post-construction phase. If the nests are relocated from an area that is to be remediated, appropriate plant species to maintain habitat quality will be revegetated or encouraged to grow along the recontoured area.

If any development is required in the KWBZ, AES 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 2015). Works within the KWBZ within the restricted activity period will require written authorization from the appropriate AEP Director. AES would engage a qualified person to prepare a KWBZ protection plan and engage with AEP prior to conducting any activities in the KWBZ during the restricted activity period.

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Limited sensory impacts to migratory birds are anticipated due to the limited emissions and noise sources associated with operation of the proposed Project. Flaring is expected to be infrequent and limited to upset conditions or planned maintenance. To date, flaring at the existing AES facility has been infrequent, and no bird mortality or injury has been observed or reported. Noise sources from the proposed Project during operation are expected to be limited to pumps and vehicular traffic.

Noise during construction will arise from drilling, the use of heavy equipment, and increased human activity on the Project site. This increase in noise during the construction period may discourage migratory birds from nesting in the vegetated fringe surrounding Wetland W3. It is anticipated that during this period, migratory birds may prefer nesting in the extensive wetlands associated with Astotin Creek, or along the banks of the North Saskatchewan River, resulting in negligible effects to migratory birds from the Project. The noise disturbance is expected to fluctuate and last the duration of construction and avoidance may only impact the nesting seasons in 2022 and 2023, as Project activities are not expected to start until the 2021 nesting season has ended and will be into the construction clean up and reclamation phase by 2024. The increased noise is not expected to affect nesting birds or fledglings.

During construction, there is potential for increased mortality risk due to vehicle strikes. AES presently has speed limit signs posted on site and all employees, contractors, and visitors are required to abide by these limits. AES will develop a Traffic Management Plan (refer to Section 18 of the DPD and Section 4 of Appendix B) to manage traffic, especially at the entrance to the facility. Where practicable, portions of the Project site will be graded or an appropriate temporary road reinforcement material (e.g. swamp mats or corduroy) will be in place to discourage potential take of ground nesting birds.

Since starting operation of the Strathcona Salt Cavern Storage Facility, no migratory birds have been observed landing on or using the brine pond. Given the proximity to the North Saskatchewan River, it is expected that migratory birds and terrestrial wildlife will preferentially use natural habitats outside of the proposed Project site. In addition, the proposed brine pond will be fully fenced and secured to prevent accidental ingress or access by ungulates and other terrestrial animals (as is the existing brine pond).

During planning for the existing Strathcona Salt Cavern Storage Facility, AES consulted with Alberta Environment and Sustainable Development (now AEP) and Canadian Wildlife Service on the potential for brine ponds to affect wildlife (Stantec 2014b). Potential concerns for 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. AES has not observed any instances of effects to birds or bird mortality due to the operation of its existing brine pond. Further, over the years of operation of AES' existing brine pond, birds have not been observed near the brine pond, likely as a result of lack of vegetation for sustenance and the proximity of Wetland W3 which offers more suitable vegetation. 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-gasifier to remove all NGL (i.e. hydrocarbon) products. It is anticipated that throughout operation, birds will be preferentially attracted to the more suitable habitat provided by either Wetland W3, or the wetlands associated with Astotin Creek.

The brine pond will be constructed and operated in compliance with approvals issued by the AER under EPEA and the *Water Act*. AES has demonstrated its commitment to compliance during the four-year operating history of the existing salt cavern facility. AES has operated its existing brine pond for over four years with no effects to migratory birds and will

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

implement the same mitigation measures (e.g. perimeter fencing, vegetation removal) on the new brine pond. The brine pond will be designed with measures that will minimize effects to wildlife and deter birds from using the pond for roosting, nesting, foraging or resting. AES will implement lessons learned from construction and operation of the existing brine pond for the Strathcona Salt Cavern Storage Facility. The pond will be fenced around the perimeter to limit access to terrestrial animals. The brine pond will be lined with double HDPE liners that will extend from the interior of the pond to the top of the pond berm. The pond berm top 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.

Due to the proximity of preferential habitat, the lack of vegetated margin, and the positive experience with AES' existing brine pond, 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, the brine pond is not expected to adversely affect migratory birds, as defined under the *Migratory Birds Convention Act*. AES regularly monitors its existing brine pond to confirm that migratory birds are not affected and to ensure mitigation measures remain effective. No effects on migratory birds have been identified to date. Should any indication of an adverse effect on migratory birds arise, AES will consider the installation of further deterrents, such as effigies, at the perimeter of the pond.

Mitigation measures for potential effects to Migratory Birds from the construction and operation of the proposed Project are included in Table 15 of Appendix B.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 20.POTENTIAL EXTRA-PROVINCIAL AND FEDERAL IMPACTS

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### *DPD Criteria*

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*A **description** of any changes to the environment that, as a result of the carrying out of the project, may occur on federal lands, in a province other than the province in which the project is proposed to be carried out or outside Canada.*

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The proposed Project is not expected to result in any changes to lands outside of the province of Alberta, to reserve lands, or to federal lands.

No portion of the proposed Project will be developed on reserve lands or federal lands. The proposed Project site will be contained wholly within the AIH. With the exception of the less than 5-kilometre pipeline ROW, the proposed Project infrastructure will be located on lands privately owned by AES, at the site of the existing Strathcona Salt Cavern Storage Facility. The pipeline ROW will be constructed on land privately owned by other industrial operators in the AIH.

The proposed Project is not expected to result in any changes to air quality inside or outside of Alberta. The emissions directly associated with the proposed Project are minimal, as discussed in Section 23.

Water will be sourced from the North Saskatchewan River through AES's existing Alberta Heartland River Water System located approximately 5 kilometres from the Project site and using AES' existing Water Act licences. No increases to existing withdrawal rates or volumes are required. Water diversion for the proposed Project will be completed in accordance with AES's *Water Act* Approvals and Licences and no impacts to downstream flows in the North Saskatchewan River watershed are expected as a result of the proposed Project.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 21. IMPACTS TO INDIGENOUS GROUPS INCLUDING TRADITIONAL LAND USE, PHYSICAL AND CULTURAL HERITAGE, AND HISTORICAL, ARCHAEOLOGICAL AND PALAEOLOGICAL RESOURCES

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### *DPD Criteria*

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*With respect to the Indigenous peoples of Canada, a description of any impact — that, as a result of carrying out the project, may occur in Canada and result from any change to the environment — on physical and cultural heritage, the current use of lands and resources for traditional purposes and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, based on information that is available to the public or derived from any engagement undertaken with Indigenous peoples of Canada.*

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### **Traditional Land and Resource Use**

No measurable residual effects on Traditional Land and Resource Use are expected as a result of the proposed Project. Potential effects to Traditional Land and Resource Use from the construction and operation of the proposed Project and planned mitigation measures are discussed below and assessed in Section 4 of Appendix B (Table 18).

AES engaged 33 First Nations, Métis Settlements and Métis Regions as part of the initial engagement activities, and subsequently engaged two additional Indigenous Communities for a total of 35 communities. AES is committed to ensuring the Indigenous Peoples of Canada have the opportunity to discuss any potential concerns. To date, specific Project discussions have taken place with eleven of these Indigenous Communities (identified in Section 4) to ensure any potential impacts of the Project are identified. Following receipt of the IAAC Summary of Issues in early March 2021, AES reached out to each of the Indigenous Communities that submitted formal issues to discuss their concerns and learn more about how AES could address them. Concerns expressed by Indigenous Communities through Project engagement activities are summarized in Section 4 and addressed throughout this DPD. Formal responses to these issues are also presented in Appendix A, including references to where additional details are provided throughout the DPD and SA

The proposed Project is located in Treaty 6, and in Métis Harvesting Area D, which extends from the east to the west of the province and from near Ponoka as the southernmost extent to north of Conklin. However, no lakes or rivers where Métis Harvesting is permitted are located within 10 kilometres of the Project site (GoA 2019). The closest First Nation reserve or Métis Settlement to the proposed Project is the Alexander First Nation, located approximately 50 km from the Project site. The lands in and around the Project site have been in use for thousands of years and have more recently been cultivated and developed in the last hundred years (NSRBC 2017).

As the Project will be located on privately owned land that is zoned for heavy industrial use by Strathcona County and is located within the AIH in proximity to other heavy industrial sites, there is limited potential for terrestrial Indigenous harvesting rights in the area to be impacted by the Project. No traditional uses of the proposed Project site by Indigenous groups or peoples have been identified in previous regional studies for the area (Stantec 2010; Stantec 2013).

The existing Strathcona Salt Cavern Storage Facility is located at SW-34-55-21-W4M where most or potentially all Project development will occur. The additional lands contemplated in the 16-hectare area in the northern portion of the adjacent NW-27-55-21-W4M parcel are currently cultivated and hold low potential for traditional uses including hunting, fishing, plant gathering, or spiritual use. There is no current traditional land use within the Project site.



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

The lands surrounding the Project are privately owned and are generally cultivated or developed with limited remaining native (i.e., Prairie) vegetation. AES is not aware of any use of lands in proximity to the Project site by Indigenous Communities for traditional purposes.

The bed and banks and associated setbacks along the North Saskatchewan River are the closest Crown land to the Project Site, approximately 4.5 kilometres away. It is unlikely that Traditional Use activities are occurring in this area due to barriers to accessing this land (i.e., access via land would involve crossing private land) and the proximity to industrial activities occurring in the AIH.

The Project is located in an area that AES understands is already avoided for traditional land use purposes due to private land ownership and existing heavy industrial development. The Project is not anticipated to result in increased avoidance of the area or any preferential use areas, nor block or remove access to preferred use areas (i.e. Crown or private land areas that may be preferred for Traditional Uses). Access constructed for the proposed Project will connect AES' land to an existing Range Road within Strathcona County and will not impact any Crown land. No increased access to Crown land which may be used for traditional purposes will result from the Project. Further, the proposed Project will not create additional disturbances that could increase the likelihood of non-Indigenous use of land and resources on Crown lands.

There is limited surface infrastructure being developed for this Project and it is being added to an existing development. Sensory disturbances associated with the Project (e.g. noise, presence of workers on site) will be limited primarily to the construction phase.

As noted above, the proposed Project is located approximately 4.5 kilometres from the banks of the North Saskatchewan River or *kisiskâciwanisîpiy*. The *kisiskâciwanisîpiy* has been an important waterway for Indigenous Groups since before contact with European explorers. The North Saskatchewan River contributes to Canada's cultural and geological history and has been an important source of fish, shoreline resources, and for freshwater use stretching back to before contact with European explorers (NSRBC 2017). No part of the Project site, including the pipeline ROW, traverses the North Saskatchewan River and the pipeline ROW crossing of Astotin Creek will be directionally drilled and completed in accordance with the *Code of Practice for Pipelines and Telecommunications Lines Crossing a Water Body* (GoA 2013). No direct impacts to the North Saskatchewan River, the River Valley or tributaries of the North Saskatchewan River are anticipated as a result of Project activities.

The Project is not expected to result in consequential adverse residual impacts to resources of importance to Indigenous peoples, including water quality or quantity, wildlife or wildlife habitat, traditional and medicinal plants, or spiritual use sites due to the extensive history of cultivation and development in the area and the very limited potential for any of the minor effects from the project to cross the boundary of the Project site. As noted above, the Project is not expected to impact fish or fish habitat or migratory birds.

AES understands that the Project lands are in an area where traditional land use was practiced by Indigenous Communities for thousands of years. Changes that have occurred in the AIH have occurred within recent history and elders and other Traditional Use practitioners in Indigenous communities may recall using the area prior to some of the large-scale developments in the AIH. AES understands that development of the Project may impact Indigenous cultural and experiential connections to the land, as it will add to existing development in the area. AES will continue to engage with interested Indigenous Communities throughout the life of the Project and will consider feedback on ways to enhance the experience on the landscape.

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## Physical and Cultural Heritage and Historical, Archaeological and Palaeontological Resources

No measurable residual effects on Indigenous physical and cultural heritage and historical archaeological and palaeontological resources are expected as a result of the proposed Project. Potential effects to these matters from the construction and operation of the proposed Project and planned mitigation measures are discussed below and assessed in Section 4 of Appendix B (Table 18). Mitigation measures around the identification and conservation of potential historical resources will mitigate any potential effects to previously unidentified resources of significance to Indigenous peoples.

The Project site has been cultivated since the early 1900s and previous archaeological surveys conducted in the area have not identified any evidence of historical structures, camps, or spiritual sites (ATCO Power 2013). Refer to Figure 10 for a map of archaeological sites identified in the proposed Project site and surrounding area.

AES received HRA Approval for SW 34-55-21-W4M in 2014 in support of the existing Strathcona Salt Cavern Storage Facility and will seek an amendment to this Approval prior to any clearing or construction activities. Should AES determine that it will utilize NW 27-55-34 W4M for the proposed Project, AES will obtain HRA Approval for this area prior to any clearing or construction activities in the quarter section. AES will also obtain HRA Approval for the pipeline ROW prior to any clearing for or construction of the pipelines. AES will, at a minimum, follow all guidance from Alberta Culture prior to commencing construction.

In accordance with the requirements of Alberta Culture and the HRA, the discovery of any Indigenous traditional use sites must be reported to the Director, Aboriginal Heritage Section of Alberta Culture. Sites that must be reported include historic cabin remains, historic (unoccupied) cabins, cultural or historical community camp sites, ceremonial sites/spiritual sites, gravesites, historic settlements/homesteads, historic sites, oral history sites, ceremonial plant or mineral gathering sites, historical trail features, and sweat/thirst/fasting lodge sites (Alberta Culture 2019). AES will follow the guidance provided by the Director, Aboriginal Heritage Section.

AES acknowledges that many of the Indigenous Communities engaged as part of the project have harvested, fished, or hunted in the AIH area in pre- or post-contact eras and have ancestral connections to the land. Although the landscape has changed through cultivation and later development, AES recognizes that members of Indigenous Communities may still feel connections to the area and that Indigenous knowledge and culture may still be obtained from these areas. AES is committed to working with Indigenous Communities to ensure anything of historical, cultural, archaeological or palaeontological significance that may be found during project activities, and throughout the Project lifecycle, is preserved and returned to the appropriate communities in accordance with applicable laws. AES has specifically been in contact with Alexander First Nation, Kikino Métis Settlement, and Métis Nation of Alberta Region 2 and has committed to developing a Discovery of Heritage and Archaeological Resources Contingency Plan and sharing an overview of this plan with these communities prior to commencing construction of the Project.

As part of this Plan, if any structures, sites, or items of historical, archaeological, palaeontological, or spiritual significance to Indigenous groups are identified during construction of the proposed Project, AES and its contractors will stop work and flag the area to prevent any further disturbance. AES will implement the Discovery of Heritage and Archaeological Resources Contingency Plan and contact a Resource Specialist. No potential sites will be further disturbed until the Resource Specialist has indicated that appropriate mitigation measures have been met. This Plan will also be included in the EPP for construction of the Project.

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Indigenous Communities have indicated knowledge of trails and potential for gravesites or other cultural heritage resources in the regional assessment area. AES will implement appropriate ESC measures to mitigate potential effects to archaeological, cultural heritage, or paleontological resources that may be undiscovered and located in wetlands or water bodies. The crossing of Astotin Creek will be directionally drilled and will not disturb any archaeological, cultural heritage, or paleontological resources that may be located in a marine environment and were washed down from further upstream.

Alexander First Nation noted a historic canoe-making site in the general area. AES further discussed this site with Alexander First Nation and learned that the site is outside of lands within AES' care and control. Although AES is not able to directly mitigate impacts to this site, AES understands that there could be additional artefacts in the general area including the Project footprint. AES will follow the protocol regarding notification of Indigenous Communities if any potential historical resource is discovered and will share an overview of the Discovery of Heritage and Archaeological Resources Contingency Plan with interested Indigenous Groups prior to commencing construction.

AES further discussed with Kikino Métis Settlement potential mitigation measures to preserve Indigenous knowledge and culture, including Indigenous language. These mitigation measures are discussed further below.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 22. IMPACTS TO INDIGENOUS HEALTH, SOCIAL, AND ECONOMIC CONDITIONS

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### *DPD Criteria*

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*A description of any change that, as a result of the carrying out of the project, may occur in Canada to the health, social or economic conditions of Indigenous peoples of Canada, based on information that is available to the public or derived from any engagement undertaken with Indigenous peoples of Canada.*

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Potential impacts to Indigenous health, social and economic conditions are discussed below and have been further assessed, including any relevant mitigation measures, in Appendix B.

### **Potential Health Impacts**

No impacts to Indigenous health are expected due to the low air emissions that will result from the Project and the limited opportunity and low likelihood for potential contaminants to enter the watershed or food chain. The Project is also not expected to adversely affect water quality or quantity, wildlife or wildlife habitat, traditional and medicinal plants, or spiritual use sites due to the extensive history of cultivation and development in the area and the very limited potential for any of the minor effects from the Project to cross the boundary of the Project Site.

Refer to Sections 14, 15, 19, 23 and 24 of this DPD, and to the assessments of air quality, surface water, vegetation, wildlife, and current use of lands and resources for Traditional Purposes in Section 4 of Appendix B, which assess potential effects and describe mitigation measures.

There are minimal air emissions associated with construction of the Project. Most air emissions associated with the Project will occur during construction as a result of dust and the use of diesel construction equipment. During construction, AES will undertake dust mitigation and erosion and sedimentation control measures to reduce potential effects of dust and particulate matter. The Project will not have emissions that could deposit atmospheric contaminants to the surrounding environment and there are no potentially acidifying substances that will be emitted by the Project. The use of diesel burning on- and off-road equipment will not occur continuously during construction and no acute or chronic effects from exposure to diesel are predicted (refer to Section 24 and Table 6 of Appendix B). Any noticeable effects from use of diesel or emission of dust and particulate matter during construction are expected to be short-term and not noticeable outside of the Project site. Due to the limited and infrequent nature of these emissions, there is no measurable residual effect as a direct result of dust and particulate matter and no predicted downstream effects to surface water quality or vegetation and wetlands as a result of these emissions. As a result, there will be no measurable interaction between air emissions and surface water, vegetative cover or wildlife species that may be harvested by Indigenous Communities as part of traditional use. Air emissions during operation of the Project will be limited to infrequent flaring and fugitive emissions and will be negligible.

An increase in noise is predicted to occur during the Construction Phase due to increased activity on the site and the addition of on- and off-road construction equipment. This noise will be short-term, intermittent and limited to the local area. Given the Project location, a noticeable increase in noise emissions is not predicted. The Project will also comply with the requirements of *Directive 038: Noise Control* (AER 2007) and with noise bylaws within Strathcona County. AES has operated the existing Strathcona Salt Cavern Storage Facility since 2016 and has received no noise complaints or feedback from the public regarding noise levels. The existing facility is operating within permissible sound levels and no additional noise control is required. Noise dampening technology is well understood and if an exceedance is noted during

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operation of the Project, noise dampening equipment will be installed. No noise levels or types of noise that could cause effects to human health (e.g., infrasound) are predicted to occur as part of Project operations. As the Project is not located in an area where Traditional Use is practiced, potential effects to Indigenous health as a result of Project construction and operation are not predicted.

The majority of the Project components will be constructed adjacent to AES's existing Strathcona Salt Cavern Storage Facility and will not result in a significant change to the landscape. It is not anticipated that construction and operation of the Project will significantly change visual aesthetics or could affect use and enjoyment of lands for Traditional Purposes.

The proposed Project is located on privately owned land that is used for industrial and agricultural purposes and is zoned for Heavy Industrial (Heartland) use. These lands are not currently used for subsistence hunting or gathering of traditional or medicinal plants, and AES therefore does not anticipate any impacts to Indigenous health associated with changes to the Project site.

The proposed Project will make use of AES' existing river water intake system owned and operated by AES and will utilize allocations from existing diversion licences held for the purposes of cavern washing. No alterations to the existing intake or additional draws on the river will be required and as such, there will be no impacts to the bed or banks of the North Saskatchewan River, to fish, fish spawning or feeding grounds, or to aquatic species as a result of the proposed Project. Refer to Section 9.2, Section 19 and Table 9 of Appendix B for additional detail.

The caverns will be developed approximately 1,800 m below surface (top of cavern) and approximately 1,500 m below shallow groundwater. Brine generated during the solution mining process will be disposed of downhole into the Nisku Formation, approximately 1,000 m below surface and approximately 700 m below the base of groundwater protection. These formations are currently utilized for cavern storage and brine disposal, respectively. For all wells, surface casing will be set below the base of groundwater protection to protect groundwater during drilling and through the life of the well, as required by the AER. The surface casing and production casing for each of the wells will be cemented to surface to ensure isolation from the groundwater zone. Due to the depths of the salt cavern and disposal formations and the isolation of wellbores from the groundwater zone, no impacts to groundwater quantity or quality are expected.

No process wastewater from the proposed Project is planned to be returned to the watershed. Any wastewater generated by the proposed Project will be minimal and will be stored on site until it is removed and disposed of in a licensed facility.

It is expected that most of the personnel engaged during the proposed Project will be local to the Edmonton Capital Region. Any increase in workers in the area is expected to be minimal and temporary in nature. Access to health care is not expected to be impacted as a result of the Project.

## **Potential Social Impacts**

Limited social impacts to Indigenous Communities are expected as a result of the proposed Project. The proposed Project is in a developed area zoned for Heavy Industrial use.

The proposed Project is bound by existing Range and Township roads and is located approximately one kilometre north of secondary Highway 15. The proposed Project is located on privately owned land and is adjacent to other privately-owned parcels.

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No impacts to traffic, or access to community resources as a result of the Project are anticipated in any Indigenous Communities. During construction, labour is largely expected to be sourced from the Edmonton Capital Region. Construction and operation of the proposed Project are not expected to significantly increase the temporary or long-term population of Strathcona County or the Edmonton Capital Region. Construction and operation of the proposed Project will not result in an increased transient workforce and no camps or other common housing is required for temporary workers. At peak, the construction workforce is expected to be approximately 175 to 200 workers who are largely expected to reside in their own homes or housing. A small portion could be expected to periodically stay in hotels in the Edmonton Capital Region, which is well suited to accommodate temporary workers.

As noted above, the potential for an increase in temporary workers during construction to adversely affect vulnerable populations is limited. Potential Project effects (positive or negative) to vulnerable members of Indigenous Communities (i.e., Indigenous women, girls, youth, and LGBTQ2S+) will continue to be considered throughout Project planning, construction, and operations through engagement with Indigenous Communities. Well-being of vulnerable populations and mitigation measures are discussed in Table 17 of Appendix B. As noted above, AES will continue to look at specific employment measures for uplifting and educating vulnerable members of Indigenous Communities and other vulnerable groups and will work towards removing barriers to participation in economic opportunities created by the Project.

Continued engagement with Indigenous Communities will support ensuring AES can effectively address social considerations such as youth and elder needs and family support services. It will also support AES in identifying how best to involve people of these communities at all phases of the Project, which may include requesting information from Indigenous Communities relating to employment by gender types in their specific communities, and consulting with social services, health services and other support organizations in each community to determine if there are opportunities for AES to contribute to ongoing social support through those organizations.

It is anticipated that interaction between Indigenous Communities and the construction and operation activities associated with the proposed Project will largely be through procurement and vendor services as described below (refer to Potential Economic Impacts). AES acknowledges the potential for effects to traditional practices and culture of any Indigenous employees of the Project due to participation in the local economy versus the traditional economy. AES understands that while development projects such as this are often positive economically for Indigenous Communities, these projects could also detract from the time available to practice traditional and cultural activities. AES has specifically discussed this potential with Kikino Metis Settlement as part of ongoing engagement and has also listened to potential mitigation measures that could support maintaining the traditional economy while participating in the local economy. These included leave during harvesting times and promoting the use of Indigenous language as part of Project naming conventions which can also support preserving Indigenous language over time. As a result of the engagement and discussion arising from the proposed Project, AES will consider adding programs, activities, policies and opportunities (to those discussed below) which support social and cultural enhancement and economic participation which positively impact and accommodate Indigenous traditional economic or cultural activities.

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AES recognizes the need for Indigenous cultural awareness training for all employees. ATCO has long demonstrated its belief in the significant value of educating our employees on the unique cultural and historical status of Indigenous Peoples and their communities. ATCO's training programs include:

- Indigenous Awareness Orientation, which provides foundational information on the history and culture of Indigenous Peoples in Canada and ATCO's history of partnerships with Indigenous groups. To date, over 6,000 employees have completed this training.
- Lunch and learn sessions, which introduce what Indigenous Relations means to ATCO and covers a variety of topics. To date, over 500 employees have attended sessions.
- Corporate Indigenous Training, which provides employees with the opportunity to gain more in-depth knowledge of the history, culture and the legal and traditional rights of Indigenous Peoples in Canada. Sessions are offered over one or two days. Nearly 600 employees have participated in this training.
- The University of Calgary Indigenous Relations Training Program, sponsored in part by ATCO, is a four-day course designed to help participants gain a better understanding of the culture, history, and current plight of Canada's Indigenous Peoples. Topics include:
  - Indigenous Ways of Knowing
  - Historical overview of Indigenous Peoples in Canada
  - Current Indigenous issues in Canada
  - Current trends in education and employment
  - Socio-cultural issues in the Northern and Circumpolar Region
  - Economic development and environmental issues in the Northern and Circumpolar Region
  - Resource development in Indigenous communities
  - Building strong community relations

To date, over 130 employees have completed this training.

Where contractors used as part of the Project do not have similar training programs, ATCO will consider offering its programs to these contractors as part of its contractor orientation process.

In addition to training its own employees on the unique cultural and historical status of Indigenous Peoples, ATCO also provides training and education to Indigenous Communities and continues to expand on its existing programs in Canada, Australia and Mexico, and develop new ones. ATCO's current programs include:

- ATCO's Annual Indigenous Education Awards program, which has been in place since 2011 and has awarded more than \$420,000 to support 342 students. In 2020, 49 First Nation, Inuit and Métis students across Canada received scholarships, bursaries and merit awards totaling \$66,000 to help pursue higher education.

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- ATCO Explore, which provides Indigenous students in Alberta with the opportunity to visit ATCO and other local worksites to further explore career and educational opportunities. In 2019, 43 grade nine students from five Indigenous communities participated in this program.
- The Utility Operator Program, a five-day program providing classroom and hands-on training for skills as a natural gas operator, and includes service installation, locating pipelines and identifying hazards in the workplace. In 2019, twelve participants took part.
- The Kitchen Skills Program, providing career-specific and life skills. In 2019, 23 Indigenous students participated in the program held at Two Rivers Lodge. 15 participants were hired by ATCO following this program.
- The Indigenous Summer Student Program. In 2019, nine students were welcomed in a variety of different roles. ATCO has committed to bring on ten students into the program in 2020.

While pandemic restrictions caused ATCO to postpone most of these programs in 2020, ATCO safely continued its Indigenous Summer Student program and welcomed Indigenous students into different roles across the company.

While these programs may not be directly related to this Project, they demonstrate that ATCO is committed to the ongoing training and education of its own employees on the Rights and cultures of Indigenous Peoples and of the Indigenous Communities with which ATCO shares the environment. They also provide the platform to continually evaluate new programs based on the needs and interests of those Indigenous Communities with which ATCO engages. As a result of the engagement and discussion arising from the proposed Project, ATCO will consider additional programs, activities and opportunities for social and cultural enhancement and economic participation which positively impact Indigenous traditional economic or cultural activities.

### Potential Economic Impacts

The economic impact to Indigenous Communities is expected to be neutral or positive. Potential effects of the Project associated with Indigenous employment and procurement are assessed in Table 18 of Appendix B. Most of the jobs generated by the proposed Project will be temporary jobs during project construction with approximately four permanent operator jobs anticipated, as discussed in Section 15.

As discussed in Section 4, AES has engaged with 35 Indigenous Communities and has received one formal Letter of Support for the Project. Several of the communities contacted have expressed interest in participating in Project construction or procurement in some manner. AES will support and prioritize employment and procurement opportunities for qualified Indigenous candidates and will review methods to support training of interested candidates. AES will evaluate opportunities to meet temporary and permanent labour force needs through the employment of Indigenous peoples with relevant qualifications or required equipment and/or services. AES is currently evaluating education and training initiatives to increase Indigenous participation as part of the proposed Project. As noted, this may include ways of accommodating cultural and social needs of Indigenous employees. AES will continue to engage with interested Indigenous Communities during the procurement process and coordinate with any selected vendors who reside outside of the region.



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As part of Project engagement activities, AES continues to evaluate opportunities to meet labour force needs through the employment of Indigenous peoples. AES will support and prioritize employment and procurement opportunities for qualified Indigenous candidates and will review opportunities to support training of interested candidates. AES' hiring policies are also inclusive of vulnerable populations. Indigenous vendors are also encouraged to participate in the competitive bid processes discussed in Section 15 for material and services.

Permanent jobs will be posted to the ATCO website and kept up for a period of several days or weeks. Depending on the skill requirements for the job, the posting may be kept open until a suitable candidate is found. The jobs will also be posted to job boards to promote the employment and uplift of diversity. Examples include boards like Working Warriors, which is a job board for Indigenous workers in Canada. Hiring needs will be identified and AES is open to reviewing opportunities for working with interested members of Indigenous Communities who wish to work with ATCO but may require additional training. Procurement opportunities will be discussed with interested Indigenous Communities who will be able to forward job postings or Requests for Proposals to appropriate personnel within the community.

The number of personnel on site at any time will fluctuate depending on the stage of construction. Few contractors or vendors will be required during cavern washing. Most personnel will be on site during construction of the product handling facility and brine pond. Given the relatively short durations for any contractors on site during construction and the addition of only approximately four permanent operators during operation of the project, limited long-term economic impact to Indigenous Communities is anticipated as a direct result of the Project.

However, engagement being undertaken as part of the proposed Project is expected to build existing relationships and develop new relationships with Indigenous Communities that would support employment and procurement opportunities for other AES or ATCO Projects. ATCO has demonstrated its commitment to working with Indigenous groups to deliberately expand procurement and employment options, uncovering opportunities for inclusion and taking steps to set relationships up for success. Indigenous employment and training opportunities efforts are measured and communicated in ATCO's Annual Sustainability Reports and ATCO has demonstrated its commitment to provide opportunities for life-changing education, training and scholarships to its Indigenous partners and communities.

ATCO's business relationships with Indigenous groups are varied—from equity arrangements and joint venture partnerships, to employee, customer, contractor and supplier relationships. Over the last several years, ATCO has successfully grown and expanded economic opportunities with Indigenous communities across its operations and continues to develop new and innovative models of economic participation with its Indigenous partners. ATCO's contributions in 2019 included:

- Over \$220 million in economic benefit generated for Indigenous partners.
- Over \$70 million in contracts awarded to Indigenous and Indigenous-affiliated contractors.
- Seven Indigenous communities purchased a combined 40 per cent equity interest in APL.
- Partnership with Three Nations Energy to expand their solar project to include a 2,200-kW solar farm, battery energy storage and microgrid control system.

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ATCO maintains 50 JVs, MOUs and other partnerships with Indigenous groups—some that have lasted decades. These relationships have direct and indirect economic participation and benefits. These partnerships are an important aspect of the economic participation opportunities ATCO advances and are above and beyond what most companies are able to offer.

ATCO continues to look for opportunities to implement Indigenous contracting strategies and develop partnerships to create jobs, opportunities for skills training and local economic development. and continues to engage communities and improve processes for procurement and supply chain management and find new ways to expand these opportunities.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 23. GREENHOUSE GAS EMISSIONS ASSOCIATED WITH THE PROJECT

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### *DPD Criteria*

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#### *An estimate of any greenhouse gas emissions associated with the project.*

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GHG emissions that would be released to atmosphere during the construction and operation phases of the proposed Project are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and N<sub>2</sub>O. GHG emission sources during construction and operations are quantified and discussed in Section 3.1 and 3.2 of the Greenhouse Gas Technical Data Report (the GHG assessment) provided in Appendix C. The GHG assessment evaluated the contribution of GHGs released during Project construction and operation activities in the context of federal and provincial GHG emissions.

Since submission of the IPD, AES has determined that it will not utilize a hot oil heater during operation of the facility. As such, emissions from this source have been removed from the GHG estimates. Further, the option to use Lot 'D' for stockpile storage has also been proposed and related activities have been included in the estimates of emissions from construction activities.

The GHG emission estimates provided for the proposed Project are expected to be an overestimate of actual GHG emissions and incorporate several conservative assumptions. These include assumptions such as:

- Each of the two flare pilots and purge would be operating continuously;
- The Project would use a gas chromatograph and it would run continuously (this equipment is pending final design and may not be utilized);
- Fugitive emissions from the Project are conservatively assumed to be natural gas;
- Lot D will be used for soil stockpiles and require land clearing activities (this is currently an option listed under Project Alternatives in Section 12);
- The harvested material from the assumed land clearing activities are also assumed to be burned (this is a conservative assumption and the vegetation that may be cleared from Lot D as part of site preparation will not be burned);
- Construction activity would spread evenly over the construction period;
- The annual electricity use is conservatively based upon equipment electrical ratings; and
- The electrical grid GHG intensity is based upon 2018 intensity although electricity grid intensities are currently lower and are forecast to continue to decline in future years.

The GHG emissions associated with construction, operation, and upstream emissions are summarized below.

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During the construction phase, there will be direct emissions from off-road equipment, on-road equipment, and other construction and space heating equipment onsite, and from land-use change activities.

- Project construction will create dust and combustion emissions associated with construction vehicles, however, the magnitude of emissions will be small; emissions are temporary and effects on air quality will be low in magnitude and local in extent. Dust control mitigation measures will be implemented during earthworks and construction.
- The direct GHG emissions from the entire construction period (2.5 years) are estimated to be 10,699 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e), of which the emission from off-road equipment accounts for about 52% (i.e. 5,574 tCO<sub>2</sub>e) of the total construction emissions followed by land-use change (43%). Using the 2018 GHG emission totals for Canada (729,000 ktCO<sub>2</sub>e) and Alberta (273,000 ktCO<sub>2</sub>e) as a baseline, the direct emissions (excluding emissions associated with land-use change activities) during the construction phase represents 0.0008% and 0.002% of Canada's and Alberta's total annual GHG emissions.
- In addition to this, during construction, it is estimated that there will 17,012 tCO<sub>2</sub>e of indirect emissions associated with imported electricity from the Alberta electrical grid.
- The maximum annual net GHG emissions for the construction phase, including both direct and indirect emissions, are estimated to be 11,085 tCO<sub>2</sub>e. The assumption, methodologies and emissions factors used to calculate emissions from each of the above sources can be found in the Sections 3 and 4 of the GHG assessment.
- During the construction phase, approximately 4 ha of trees and shrubs and 1 ha of grassland may be removed and converted to industrial land. Based on the most conservative assumptions, the release of carbon associated with this 5 ha of land is expected to be 4,625 tCO<sub>2</sub>e. The emissions represent approximately 0.0006% and 0.002% of 2018 Canada and Alberta total annual GHG emissions. Given the limited clearing associated with the Project, effects on carbon sinks are limited, and land clearing is estimated to have an immaterial impact on climate change. The detailed calculation can be found in the GHG assessment (Appendix C Sections 3 and 4).

During the operation phase of the Project, there will be negligible emissions from flaring and fugitive emission sources. No stationary combustion sources will be used and no venting to atmosphere or industrial process emissions will occur as part of the operation of the proposed Project.

- The only combustion sources associated with the project during operations are expected to be the two flares which will be used intermittently associated with maintenance or during upsets, or as part of intermittent brine de-gasification. There are no continuous combustion sources of emissions during operation other than the negligible emissions from the pilot and purge gas for the flare stacks noted above. An assessment of potential impacts to air quality was completed associated with non-routine flaring using dispersion modelling which demonstrated that ambient concentrations of SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>2.5</sub> and CO associated with the flare emissions were predicted to be much lower than air quality objectives.

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- The direct GHG emissions from Project operation are estimated to be 1,593 tCO<sub>2</sub>e per year, of which the emissions from flaring accounts for about 94% (i.e., 1,497 tCO<sub>2</sub>e per year) of the annual operation emissions followed by fugitive (6%). Using the 2018 GHG emission totals for Canada and Alberta as a baseline, the direct emissions during the operational phase are equal to 0.0002% and 0.0006% of Canada's and Alberta's total annual GHG emissions.
- In addition to this, the indirect emissions associated with imported electricity during operation is estimated to be 59,568 tCO<sub>2</sub>e per year. The project does not capture and store CO<sub>2</sub> and there are no avoided emissions as a result of this Project.
- The maximum annual net GHG emissions for the operation phase, including both direct and indirect emissions, are estimated to be 61,161 tCO<sub>2</sub>e per year. The assumption, methodologies and emissions factors used to calculate emissions from each of the above sources can be found in Sections 3 and 4 of the GHG assessment.

Based on the screening level estimate of upstream GHG emissions, and as discussed in Section 6 of this DPD, the upstream emissions associated with the Project are significantly below the thresholds provided by the SACC. The proposed Project will not have upstream GHG emissions greater than or equal to the thresholds outlined in Table 1 of Section 3.2.2 of the SACC. These upstream GHG thresholds, which begin at 500 kt CO<sub>2</sub>e per year for 2020 to 2029 and end at 100 kt CO<sub>2</sub>e per year in 2050 and beyond, greatly exceed the estimated upstream emissions associated with the Project. The highest total annual upstream emissions expected in relation to the Project between 2024 and 2030 is 12.64 kt CO<sub>2</sub>e. Upstream emissions are not expected to increase post-2030 as the various federal and provincial emissions reductions requirements are expected to be further implemented.

Overall, the GHG emissions associated with Project construction and operation are very low in magnitude when compared to provincial and national emission totals.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 24. WASTE AND EMISSIONS GENERATED BY THE PROJECT

### DPD Criteria

*A description of any waste and emissions that are likely to be generated — in the air, in or on water and in or on land — during any phase of the project and a description of the plan to manage them.*

#### Solid Wastes

Solid wastes will be generated during construction and decommissioning. Very low quantities of solid waste are expected to be generated through the ongoing operation of the storage caverns.

Waste oil will be stored in secure containers with secondary containment. Containers will be stored in well-ventilated, shaded areas wherever possible. Any waste that has a potential to be released to the environment will have secondary containment as per AER's Directive 55 Storage Requirements for the Upstream Petroleum Industry. Suitable containment will be used to contain waste and incompatible wastes will not be stored together.

All wastes will be disposed of according to the applicable provisions of AER *Directive 058: Oilfield Waste Management Requirements for the Upstream Petroleum Industry* (AER 2006), and as required during construction, the *Waste Control Regulation* and the requirements for each waste classification outlined in the Alberta Waste Users Guide for Waste Managers (AEP 1996). 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 procedures and management of waste during operations will be incorporated into existing operating procedures. The waste volumes generated during the operations phase will be much smaller than those generated during the construction phase. A description of wastes that are likely to be generated as part of the Project and the methods planned to manage them are identified in Tables 8 and 9.

*Table 8: Solid Wastes Generated by the Project during Construction*

Waste Stream	Description	Management Method
Domestic waste	Waste generated by construction crew personnel including packaging from foods, supplies, etc. and food wastes.	A waste disposal firm will be contracted to collect the garbage from the site trailers and lunch rooms
Recyclables (wood, paper, metal)	Cut-off materials from steel and plastic piping, electrical cables, pallets and lumber, bulk material cardboard and plastic packaging, and similar items	Construction crews will be required to collect all materials that can be recycled and to separate them into the appropriate bins on site. A recycling company will be contracted to collect the bins and recycle the materials
Mixed Construction Wastes	Mixed or single materials that are not suitable for recycling or cannot be separated to meet recycling requirements, including concrete waste, non-recyclable packing, and similar	Construction crews will collect the mixed wastes and dispose in bins on site, which will be collected by a contracted company and disposed of in accordance with applicable requirements.

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Waste Stream	Description	Management Method
Sewage	Sewage from construction crew personnel	Portable outhouses and wash cars will be employed to serve the crews. Maintenance and servicing of the facilities will be contracted to a company licenced to handle the facilities and wastes.
Hydrovac waste	Soil/water slurry generated by hydrovac excavation activities	Clean hydrovac material may be stored on the Project site and reclaimed Contaminated hydrovac material will be disposed of at an authorized disposal facility

Table 9: Solid Wastes Generated by the Project during Operations

Waste Stream	Description	Management Method
Domestic and Shop waste	Small volumes of domestic garbage and items such as rags	Minimal garbage will be generated on site. It will be collected in garbage cans in the operator area and emptied regularly by a contracted firm.
Recyclables (wood, paper, metal)	Minimal volume of recyclable materials such as paper, drink containers and similar will be generated by the operations team	Any recyclable materials will be collected in labeled bins and taken for recycling on an as-needed basis.
Hazardous waste	As required, the filter elements at the facility will be removed from service and new ones installed During plant maintenance outages, spent calcium chloride may be removed from the dehydration vessels and replaced with new material.	The condition of the filters will be assessed regularly by monitoring the pressure drop across them. When required, the filters will be changed out and new ones installed. The used filters will be disposed of at an appropriately licensed facility. Spent calcium chloride material removed from the dehydration vessels will be collected and disposed of at an appropriate facility.
Waste oil	Small volumes of oil will be collected from the facility pumps when oil changes are required	Operating hours of the pumps will be monitored, and the oil changed when the recommended number of operating hours is reached. Used oil will be collected on site in suitable storage containers and sent to an oil recycling facility.

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## Water

Water for the proposed Project will be sourced from the North Saskatchewan River through existing infrastructure and under existing water diversion licences. Liquid discharges from the Project will consist of brine, small amounts of process wastewater, and domestic sewage.

Brine will be generated during the development of the caverns and will include high concentrations of dissolved sodium chloride from the salt formation as well as hydrocarbon residue from the control fluid (condensate) used during washing. Brine will be disposed through one existing licensed disposal well owned and operated by AES and through one disposal well to be developed as part of the Project. (Brine not disposed of and diverted to the brine pond will go through a brine degasification process, as described in Section 9).

No effluent is generated onsite, with the exception of leachate collected in the pond's leak detection system. Piping will collect and convey any leachate to a pump, which will return the leachate back to the brine pond. The rate of leachate pumping is monitored remotely.

Small amounts of process wastewater may be periodically generated by the NGL process dehydrators. All process wastewater will be temporarily stored on site in a small above ground tank (approximately 65 m<sup>3</sup>) which will be installed with secondary containment. The contents will be disposed of at a licensed disposal facility as required. A similar tank for process wastewater is in place at AES' existing Strathcona Salt Cavern Storage Facility and to-date, has not been required to be utilized because no process wastewater has been produced.

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.

AES has a stormwater and groundwater management plan for the existing Strathcona Salt Cavern Storage Facility to allow for surface water and high-level ground water beneath the existing brine pond to be collected and managed in accordance with the EPEA approval conditions. This stormwater and groundwater management plan will be updated to include the additional surface facilities and drainage associated with the proposed Project as part of the amendment application under EPEA Approval 357248-00-01. Details are provided in Sections 9 and 19.

Mitigation measures for potential effects to surface water and groundwater quantity and quality from the construction and operation of the proposed Project are included in Tables 9 and 10 of Appendix B.

## Air

Emissions as part of the project will be limited to dust and particulate matter from diesel operated equipment during construction and from flaring and fugitive emissions as a result of operations. No additional emissions from equipment are expected. No emissions are expected as a result of stationary combustion sources, venting, or industrial processes. Refer to Sections 6, 14, 15, 22 and 23 of this DPD and Table 6 of Appendix B for additional details including mitigation measures for any potential effects on air quality from the construction and operation of the proposed Project. Details are also provided below.



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## Construction Phase:

Air emissions as a result of construction of the Project will consist of the following two sources:

- Project emissions during construction will be released as a result of vehicle and equipment use. Emissions from construction activities are expected to result from on- and off-road equipment used for construction with minimal emissions from other equipment (e.g., diesel-fueled heaters). Emissions from diesel-fueled vehicles will not be continuous throughout the construction period. Typical emissions from diesel engines include carbon monoxide (CO), hydrocarbons, aldehydes, NO<sub>x</sub>, and SO<sub>2</sub> (NETT 2021). Emissions from diesel-power equipment as a result of the Construction Phase are expected to be low and intermittent throughout construction and are not expected to result in acute or chronic effects to human health.
- Dust may be created during construction, though it is expected to be minimal. AES will implement dust management processes during construction and operation of the proposed Project. No dust would be released in a volume sufficient to cause acute or chronic reactions in human or wildlife health receptors. Dust will be controlled as part of Project operation and maintenance by the application of water. A complete list of dust suppression measures will be included in AES' EPP for project construction.

It is predicted that greater than 99% of emissions during construction will be CO<sub>2</sub>. Approximately 5,925 tonnes of CO<sub>2</sub> will be emitted by construction activities with less than 1% of CH<sub>4</sub> and N<sub>2</sub>O emissions. Refer to Appendix C for a breakdown of all GHGs to be emitted by the Project. The magnitude of emissions from dust and construction vehicles will be small and temporary. Effects on air quality will be low in magnitude and local in extent. Dust control mitigation measures will be implemented during earthworks and construction as described in Table 6 of Appendix B.

Construction will occur in phases and segments, including construction of the pipeline ROW. Construction activities associated with the Project will have the potential to temporarily affect air quality in the immediate vicinity of the Project, however the effect is expected to be short-term and intermittent in duration and localized to the immediate area before potentially dispersing to the airshed as a result of wind. Due to the combustion of diesel from construction equipment, there is potential that there could be a short-term, intermittent, and localized increase in dust and particulate matter. It is not expected to result in a change to surface water or ecosystem quality due to the minimal deposition and lack of continuous emissions.

Diesel is a typical fuel used in construction and by private citizens who own diesel-burning vehicles or generators. There is no anticipated effect to human health due to the short-term and intermittent combustion of diesel during construction, the lack of nearby sensitive receptors, and minimal to no deposition of particulates or metals. While diesel is considered a carcinogenic substance, the evidence linking diesel to cancer suggests that exposure to diesel must be chronic (i.e., occur continuously over an extended period of time; HPA 2006). Due to the short duration of construction and the intermittent presence of on- and off-road construction equipment during the construction period, the Project is not predicted to cause acute or chronic health effects to any receptors.

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There is one permanent resident within 500 metres of the Project site and no known residents along the pipeline ROW. The lands selected for the pipeline ROW are privately held by other industrial entities. It is unlikely that there are temporary residences or campsites within 100 metres of the pipeline ROW; however, this will be confirmed during survey activities along the ROW and as part of pipeline permitting requirements. If a complaint about air quality is received during construction, AES will work with the stakeholder to address their concerns and may implement additional monitoring measures, such as engaging a qualified person to check real-time concentrations near the residence using a hand-held monitor and comparing the results to ambient air quality criteria.

## Operations Phase:

Air emissions as a result of operation of the Project will be very low in magnitude and limited to products of combustion and fugitive emissions from the following sources:

- Small volumes of hydrocarbons, de-gassed from brine after withdrawal from the caverns and prior to storage in the brine pond. Recovery of hydrocarbons from the brine will be required infrequently. 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* (AER 2020) and AES' EPEA Approval, as amended;
- Intermittent emissions from the plant flare stack during any upset conditions or maintenance, and potentially from operation of the gas chromatograph being considered in the design of the Project (which is directed to flare); and
- Fugitive emissions from unintentional releases of GHG's to the atmosphere from an equipment component that leaks as a result of wear or damage. Sources of fugitive emissions include but are not limited to connectors, valves, flanges, and pumps.

Since submission of the IPD, AES has determined that process heaters being considered for use as part of the dehydration system will not be utilized for the Project, and as such, there will be no associated intermittent emissions.

As discussed in Section 23 and detailed in Appendix C, the GHG emissions associated with Project construction and operation are low in magnitude when compared to provincial and national emission totals.

During operations, the Project will not emit volatile organic compounds, sulphur oxides, hydrogen sulphide, coarse and fine particulate matter, diesel particulate matter, polycyclic aromatic hydrocarbons, or metals. The Project will not release any acidifying substances or any atmospheric contaminants with the potential to affect terrestrial and aquatic ecosystems.

Emissions from the Project are not expected to have a noticeable impact on regional air quality, which is monitored by the FAP to compare regional air quality against the Alberta Ambient Air Quality Objectives (AAAQO). The Canadian Ambient Air Quality Objectives (CAAQS) and AAAQO were considered during development of the Project. Emissions from the Project during operations will be intermittent and limited to flaring events for upset conditions, planned maintenance or pilot gas, and minor fugitive emissions related to process piping and equipment. The Project, alone or in combination with existing development, is not expected to result in exceedances of the criteria in either the AAAQO or the CAAQS.

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Acid deposition was qualitatively evaluated based on the predicted emissions from the Project. The dominant land use in the area is industrial and agricultural. As such, it is difficult to determine a baseline for acidification, as agricultural practices such as fertilization and root uptake may result in greater acid inputs to soil than from atmospheric deposition (Turchenek and Abboud 2001).

Predicted ground-level concentration's of SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>2.5</sub>, and CO are well below Canadian Ambient Air Quality Standards and Alberta Ambient Air Quality Standards (<1 µg/m<sup>3</sup>) and there will be minimal atmospheric deposition associated with the Project. The Project site is located in an area where much of the named soils are Chernozems, which are well buffered against the effects of acid deposition because they are characterized by having a base saturation greater than 80% in the topsoil (Soil Classification Working Group 1998). The Project is not predicted to emit contaminants that would increase acid inputs into the surrounding terrestrial or aquatic environment and is not predicted to have any measurable effect on potential acidification or to result in an exceedance of the ecosystem's critical loads.

## Noise

Noise sources during construction will be primarily from drilling and construction activities, including excavation equipment for the brine pond and pile driving. The proposed Project is located in an area zoned for Heavy Industrial use. Construction is anticipated to occur primarily during daytime hours (i.e., 07:00 to 19:00), with the exception of drilling which will occur on a continuous (24 hours per day seven days a week) basis while the wells are being drilled, and certain earth moving operations. The total duration of drilling activities is expected to be approximately 40 weeks, with some downtime and reduction in noise levels between each of the wells. AES demonstrated its ability to work with area residents during drilling activity associated with the existing Strathcona Salt Cavern Storage Facility and mitigate noise concerns associated with drilling and construction. AES will comply with AER *Directive 038: Noise Control*, Section 3.11 Construction Noise (AER 2007) during construction of the Project. Any stakeholder complaints will be responded to immediately.

Noise sources during operation will be minimal and will come primarily from pumps for product injection and withdrawal. A Noise Impact Assessment for the Project will be completed in accordance with *Directive 038: Noise Control* (AER 2007) prior to submission of the AER applications for the surface facilities to ensure noise from facility operation is within allowable limits. No residual effect is predicted as a result of noise levels at the Project Site. AES has operated the existing Strathcona Salt Cavern Storage Facility since 2016 and has received no noise complaints or feedback from the public regarding noise levels. The existing facility is operating within permissible sound levels and no additional noise control is required. Noise dampening technology is well understood and if an exceedance is noted during operation of the Project, noise dampening equipment will be installed.

If the Noise Impact Assessment indicates that noise levels at a receptor are higher than permissible levels, AES will install additional noise dampening measures. A Noise Impact Assessment conducted in Alberta for an energy project must be conducted in accordance with the prescriptive guidance in Appendix 4 of *Directive 038: Noise Control* (AER 2007). When conducting this Noise Impact Assessment, AES will also consider the guidance provided in Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment* (Health Canada 2016).

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All noise emissions from the Project will comply with *Directive 038: Noise Control* (AER 2008). Compliance with *Directive 038: Noise Control* (AER 2008) will be demonstrated through conformance with the Regional Noise Model developed through the Northeast Capital Industrial Association (NCIA), in collaboration with the AER. 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.

Mitigation measures for potential effects of noise from the construction and operation of the proposed Project are also included in Section 4 of Appendix B.

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# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## APPENDIX A – ATCO SUMMARY OF RESPONSES TO IAAC SUMMARY OF ISSUES

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

The following table provides the specific list of the issues raised through comments received by Impact Assessment Agency of Canada (IAAC) on the proposed Project during the IAAC-led engagement public comment period and received by ATCO Energy Solutions on March 1, 2021. The purpose of this Table is to provide reference to where specifically AES has provided responses to these issues in the Detailed Project Description (DPD) or its Appendices, and in particular where, if applicable, in the Screening Assessment (SA) provided in Appendix B to the DPD.

All references provided support AES' response to the issue provided by IAAC. Where discussion is included within the DPD or its Appendices additional to the reference to the direct response, it is qualified as "see also".

		DPD and Appendices Reference	SA Reference
<b>Accidents and Malfunctions</b>			
1	Clarity on risks and potential effects of failure of containment structures on the brine pond, spills or leaks, including leakage of materials from the salt caverns, pipeline ruptures, explosions, uncontrolled releases of explosive gases, and emergency venting from pressurized lines and vessels, as well as planned mitigation measures.	Section 9.4.1 Section 9.4.2 Section 12  See also: Section 9.4.3 Section 13 Section 18	Section 6
2	Clarity on the spill prevention, preparedness, response measures and monitoring systems, response capacities, and emergency management plans that will be implemented.	See also: Section 13 Section 18	Section 6.2, 6.3
<b>Acoustic Environment</b>			
3	Recommendation that the noise impact assessment be conducted in accordance with Health Canada's <i>Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise</i> , including a comparison between existing (baseline) noise, Project-related noise, and Project plus baseline noise levels.	Section 24	Section 4, Table 7
<b>Alternative Means of Carrying Out the Project</b>			
4	Discuss the potential impacts of the alternative means of carrying out the Project on greenhouse gas (GHG) emissions and how GHG emissions were considered as a criterion in the alternatives selection.	Section 12	N/A

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

		DPD and Appendices Reference	SA Reference
<b>Atmospheric Environment</b>			
5	Clarity on whether the assessment of potential impacts to air quality includes stationary combustion sources, emissions from equipment (intentional and non-intentional), flaring and venting, fugitive emissions sources, industrial process emissions (if applicable), and particulate matter from activities that cause physical disturbance to the land, such as earth moving, land clearing, drilling, and transportation.	Section 23 Section 24 Appendix C	Section 4, Table 6
6	Clarity on the types of air contaminants that will be released from the Project during all phases and whether potential releases of volatile organic compounds, sulphur oxides, nitrogen oxides, carbon monoxide, hydrogen sulphide, coarse and fine particulate matter, diesel particulates, polycyclic aromatic hydrocarbons, and metals were considered.	Section 24  See also: Section 14	Section 4, Table 6
7	Clarity on whether federal or provincial air quality standards, such as the Canadian Ambient Air Quality Standards or Alberta Ambient Air Quality Objectives, were used to assess potential effects to human health from air pollutants, based on predicted concentrations.	Section 24	N/A
8	Potential effects to terrestrial and aquatic ecosystems, including water, soil, plants, fish and fish habitat, and wildlife, due to deposition of atmospheric contaminants from the Project in the surrounding environment and potential acidification and exceedance of ecosystems' critical loads.	Section 24  See also: Section 15 Section 19 Section 22	Section 4, Table 6
9	Potential effects to human health and sensitive ecosystem receptors due to degradation of local and regional air quality as a result of emissions associated with the Project and cumulative emissions.	Section 15 Section 22 Section 24  See also: Section 14 Section 19	Section 2.3, Table 3 (Preamble, Footnote)  Section 4, Table 6

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

		DPD and Appendices Reference	SA Reference
<b>Climate Change and Greenhouse Gas Emissions</b>			
10	Assessment of the Project's GHG emissions and contribution to climate change as per the Strategic Assessment of Climate Change (SACC), with consideration of the Government of Canada's long-term goal to achieve net-zero emissions by 2050 and a description of the planned mitigation measures, technologies, and best practices to be applied.	Section 6 Section 23 Appendix C  See also: Section 12	Section 4, Table 6
11	Provide an estimate of the maximum annual net GHG emissions for each phase of the project, including a breakdown of each term of Equation 1 of the SACC and the methodology, data, emission factors, and assumptions used (section 4.1.1, SACC).	Section 23 Appendix C	N/A
12	Potential effects on carbon sinks (e.g. forested areas, cropland, grassland, wetlands, etc.) and implications for climate change, per section 4.1.2 of the SACC.	Section 23 Appendix C	N/A
<b>Cumulative Effects</b>			
13	Potential for the Project to result in increased upstream oil and gas activities due to the increase in storage capacity for natural gas liquids.	Section 7	N/A
<b>Economic Conditions</b>			
14	Employment estimates during operations is provided, but clarity is needed on the number of new employment opportunities, if any, that will be available during construction and whether the Project will generate indirect and/or induced employment opportunities and the possibility of a boom-bust cycle in the local economy as the Project moves from the construction to the operations phase, and means to mitigate and monitor effects.	Section 15  See also: Section 22	Section 4, Table 17 Section 4, Table 18
15	Clarity on whether under-represented groups in the labour market, such as Indigenous peoples, women, and persons with disabilities, will be given priority for employment and/or training opportunities.	Section 22 Section 15	Section 4, Table 17 Section 4, Table 18
16	Need for information on the proponent's hiring strategy, including anticipated training opportunities. Include a description of the occupations involved, what skills may be required for potential candidates, and how information on job opportunities will be disseminated.	Section 15 Section 22	Section 4, Table 17 Section 4, Table 18
17	Need for medium and long-term economic projections for the region to assess the net social and economic benefits from indirect economic growth that may result from the Project.	Section 15	N/A

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

		DPD and Appendices Reference	SA Reference
18	Potential effects to the local economy, including the standard of living of nearby residents and property values.	Section 15	N/A
<b>Effects of the Environment on the Project</b>			
19	Potential effects of climate change on the Project that could lead to accidents and malfunctions, including clarity on measures or design features to increase the resilience of the Project to climate change.	N/A	Section 7
<b>Fish and Fish Habitat</b>			
20	Potential effects to fish and fish habitat and other aquatic life, including consideration of cumulative effects, due to surface disturbance and erosion, the potential introduction of contaminants into fish-bearing waterbodies, and effects to water quality and quantity, and means to mitigate and monitor effects.	Section 19	Section 4, Table 11
<b>Follow-up and Monitoring</b>			
21	Confirmation that engaged Indigenous groups will be informed or participate in the Groundwater Quality Monitoring Framework, including those that are not required by Alberta (i.e. Non-Treaty groups listed in Table 2 of the Initial Project Description).	AES understands that the Northeast Capital Industrial Association (NCIA) Regional Groundwater Management Framework will be developed by NCIA. AES is not currently a member of the NCIA and cannot advise on who will be informed or offered opportunities to participate in the framework.	
22	Clarity on proposed reclamation and remediation plans including how surface facilities, particularly the brine pond, and the caverns will be decommissioned, including how the structural integrity of the caverns will be maintained and monitored after decommissioning.	Section 9.4.3	N/A
23	Clarity on proposed follow-up and monitoring plans.	Section 18  See also: Section 9.4.2 Section 19 Section 24	Section 4, Tables 6 to 18  Section 6



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

		DPD and Appendices Reference	SA Reference
<b>Human Health and Well-Being</b>			
24	Clarity on the locations of all potential human receptors in the local and regional study area, including residences and sensitive receptors, the distance of these receptors from key Project components and activities, and potential effects to human health at these receptor locations from changes to air quality, water quality, noise levels, and visual disruptions.	Section 13 Figures 10, 11  See also: Section 15 Section 24	Section 2.3, Table 3 (Preamble, Footnote)  Section 4, Table 6 Section 4, Table 7 Section 4, Table 8 Section 4, Table 18
25	Potential effects to human health due to the release of diesel particulate matter from diesel- fueled equipment during construction, including potential carcinogenic and non-carcinogenic effects, and means to mitigate and monitor effects.	Section 24	N/A
<b>Indigenous and Stakeholder Consultation and Engagement</b>			
26	Clarity on the long-term communication plan to inform Indigenous peoples of Project updates, including safety, decommissioning, reclamation, and abandonment activities.	Section 4  See also: Section 9.4.3 Section 21 Section 22	Section 4, Table 18
27	Request for funding and capacity building for Indigenous groups to support adequate consultation and engagement activities and to support traditional land use studies to identify potential effects of the Project, including potential impacts to Indigenous rights.	Section 4	N/A
28	Need for engagement and consultation with Indigenous groups on Environmental Protection Plans, including those related to surface water and wetlands.	Section 4	N/A
29	Need for meaningful consultation and engagement with Indigenous communities, in accordance with any consultation agreements and/or protocols, throughout the regulatory process and during the post-decision phase, including site visits, identification of both positive and negative impacts of the Project, and measures to address concerns.	Section 4 Section 21 Section 22	Section 4, Table 18
30	Approach to working with Indigenous peoples with the principle of free, prior, and informed consent (United Nations Declaration on the Rights of Indigenous Peoples).	Section 4	N/A

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

		DPD and Appendices Reference	SA Reference
<b>Indigenous Peoples' Current Use of Lands and Resources for Traditional Purposes</b>			
31	Potential effects of the Project and cumulative effects to the current use of lands and resources for traditional purposes by Indigenous peoples and the practice of Indigenous rights due to sensory disturbance and avoidance of traditional use areas or resources due to real or perceived contamination and health risks, or through reduced availability.	Section 21 Section 22  See also: Section 4 Section 13	Section 4, Table 18
32	Potential effects of the Project and cumulative effects to the traditional lands, traditional land use, rights, culture (i.e. spiritual practices; knowledge, cultural, and language transmission; cultural identity; and traditional ways of life), and experience on the landscape of Indigenous peoples whose traditional territory overlaps with the Project area, including the use of lands, waters, and vegetation, wildlife, aquatic, and other resources of importance (e.g. duckeggs) for subsistence, medicinal, spiritual, economic, commercial, recreational, and cultural purposes, and means to mitigate and monitor effects.	Section 21 Section 22 See also: Section 4 Section 13 Section 14 Section 15 Section 19 Section 24	Section 4, Table 6 Section 4, Table 7 Section 4, Table 9 Section 4, Table 10 Section 4, Table 11 Section 4, Table 13 Section 4, Table 14 Section 4, Table 15 Section 4, Table 16 Section 4, Table 18
<b>Indigenous Peoples' Health and Well-being</b>			
33	Potential effects to the health of Indigenous peoples through consumption or use of drinking water, country foods, and medicinal plants exposed to contaminants from the Project in water, air, or soil.	Section 22  See also: Section 13 Section 14 Section 15 Section 19 Section 24	Section 4, Table 6 Section 4, Table 9 Section 4, Table 10 Section 4, Table 11 Section 4, Table 13 Section 4, Table 14 Section 4, Table 15 Section 4, Table 18

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

		DPD and Appendices Reference	SA Reference
<b>Indigenous Peoples' Rights</b>			
34	Need to consider the historical connection of Indigenous groups to the Project area in determining potential impacts to Indigenous rights, rather than the current location of reserve lands and/or band offices.	Section 4 Section 21 Section 22	Section 4, Table 18
<b>Indigenous Peoples' Social and Economic Conditions</b>			
35	Need for Indigenous cultural awareness training for all Project employees and accommodation of Indigenous cultural values for Indigenous employees.	Section 22  See also: Section 15	Section 4, Table 17 Section 4, Table 18
36	Potential effects to traditional practices and culture of any Indigenous employees of the Project due to participation in the local economy versus traditional economy, including consideration of cumulative effects.	Section 22	Section 4, Table 18
<b>Indigenous Peoples' Spiritual, Physical, and Cultural Heritage</b>			
37	Potential effects to Métis culture due to effects to water resources and lands important for ceremonial purposes.	Section 21  See also: Section 4 Section 9.4.1 Section 13 Section 14 Section 18 Section 19	Section 4, Table 6 Section 4, Table 9 Section 4, Table 18
38	Clarity on approach to ground-truthing and on-site monitoring before and during construction to verify the location of sacred sites and objects of importance to Indigenous peoples.	Section 21  See also: Section 18	Section 4, Table 17 Section 4, Table 18

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

		DPD and Appendices Reference	SA Reference
39	Need for notification of Indigenous groups should any historical resources of importance to Indigenous peoples be identified or discovered, and the need to preserve these resources and return them to Indigenous communities.	Section 21  See also: Section 18	Section 4, Table 17 Section 4, Table 18
40	Potential effects to physical and cultural heritage and structures, sites, or things of historical, archaeological, and paleontological significance to Indigenous peoples due to surface disturbance and excavation, including burial and sacred sites, trails, and travel routes, such as the North Saskatchewan River and North Saskatchewan River Valley (an important current and historical travel route for Indigenous peoples), and means to mitigate and monitor effects.	Section 21  See also: Section 4 Section 18	Section 4, Table 17 Section 4, Table 18
41	Potential effects to an historic campsite and canoe-making site located to the west of the Project area that is significant to Indigenous peoples.	Section 21	N/A
<b>Migratory Birds and their Habitat</b>			
42	Clarity on measures to monitor and adaptively respond to potential effects to migratory birds throughout the Project life. This includes effects from contact with the brine pond or potential spills, collisions with infrastructure or vehicles, and sensory disturbance.	Section 19  See also: Section 14 Section 18	Section 4, Table 15  Section 6
<b>Species at Risk, Terrestrial Wildlife, and their Habitat</b>			
43	Clarity on measures to mitigate, monitor, and adaptively respond to potential effects to wildlife, species at risk, and their habitat throughout the Project life. This includes effects from contact with the brine pond or potential spills, habitat removal, and sensory disturbance.	Section 19  See also: Section 18	Section 4, Table 15  Section 6
<b>Vulnerable Population Groups (GBA+)</b>			
44	Clarity on how gender diversity, age (e.g. youth versus elders), and circumstances specific to Indigenous women and girls were considered in the assessment of potential Project effects to Indigenous peoples.	Section 15 Section 22	Section 4, Table 17

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

		DPD and Appendices Reference	SA Reference
45	Clarity on consultation and engagement processes, including within the local community, that will support the identification of different needs and ensure transparency and inclusivity, including barriers to participation in consultation for local under-represented groups.	Section 15 Section 22  See also: Section 4	Section 4, Table 17
<b>Water – Groundwater and Surface Water</b>			
46	Potential effects to water quality and fish and fish habitat, including for Astotin Creek and the North Saskatchewan River, from activities associated with construction and operation of pipelines, including horizontal directional drilling below wetlands and watercourses; use of machinery near watercourses; disturbance of streambanks and wetlands; and potential frac- out.	Section 19  See also: Section 14 Section 18 Section 21	Section 4, Table 9 Section 4, Table 10 Section 4, Table 11 Section 4, Table 14
47	Potential effects to water quantity due to water withdrawals from the North Saskatchewan River for cavern washing, including consideration of cumulative effects, and means to mitigate and monitor effects.	Section 9.2 Section 9.4.1  See also: Section 18 Section 19 Section 20 Section 22	Section 4, Table 9
48	Clarity on the location of local and regional drinking water sources and water treatment facilities, including their proximity to the Project site.	Section 13 Figures 10, 11	N/A
49	Potential effects to drinking water (i.e. surface and groundwater sources), water used for recreational purposes, and water treatment facilities, including consideration of cumulative effects, from spills of fuels, hydrocarbons, chemicals, and waste products, and leaching of potentially toxic substances from the brine pond and salt caverns, and means to mitigate and monitor effects.	Section 13  See also: Section 9.4.1 Section 18 Section 19	Section 4, Table 9 Section 4, Table 10  Section 6

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

		DPD and Appendices Reference	SA Reference
50	Clarity on proposed management plans to ensure that the brine pond, deep well injection, and storm water runoff do not impact surface water quality.	Section 9.4.1 Section 9.4.2 Section 18  See also: Section 19	Section 4, Table 9 Section 4, Table 10 Section 4, Table 12 Section 4, Table 13 Section 4, Table 14  Section 6
<b>Wetlands</b>			
51	Clarity on the hydrological connectivity of wetland (W3) with Astotin Creek, including during major precipitation events, and potential effects to Astotin Creek should flows from wetland (W3) interact with Astotin Creek.	Section 14 Section 19	N/A
52	Potential effects of the Project and cumulative effects on wetland function, direct loss of wetlands, quality of wetland habitat, and residual effects, including consideration of socio- economic and ecological functions of wetlands and any resultant effects to migratorybirds, species at risk and other wildlife, and surface water.	Section 19  See also: Section 14	Section 4, Table 14
<b>Other</b>			
53	Potential effects to existing caverns associated with other nearby facilities.	Section 13	N/A

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## APPENDIX B – ATCO SALT CAVERN STORAGE EXPANSION PROJECT SCREENING ASSESSMENT



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

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Screening Assessment

March 31, 2021

# ATCO

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always there. anywhere.



# SCREENING ASSESSMENT

# SALT CAVERN STORAGE EXPANSION PROJECT

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# SCREENING ASSESSMENT

# SALT CAVERN STORAGE EXPANSION PROJECT

## ABBREVIATIONS AND ACRONYMS

%	percent
ABSA	Alberta Boiler Safety Association
AEP	Alberta Environment and Parks
AER	Alberta Energy Regulator
AES	ATCO Energy Solutions
AHRWS	ATCO Heartland River Water System
ASME	American Society of Mechanical Engineers
CAER	Community Awareness Emergency Response
CO <sub>2</sub> e	carbon dioxide equivalent
CSA	Canadian Standards Association
DPD	Detailed Project Description
EPEA	<i>Environmental Protection and Enhancement Act</i>
EPEA	<i>Environmental Protection and Enhancement Act</i>
EPZ	Emergency Planning Zone
ERP	Emergency Response Plan
ERP	Emergency Response Plan
ESC	Erosion and Sedimentation Control
ESC	Erosion and Sedimentation Control
GHG	greenhouse gas
GWMP	Groundwater Monitoring Program
HAZOP	Hazard and Operability Analysis
HRA	<i>Historical Resources Act</i>
IAAC	Impact Assessment Agency of Canada
ICS	Incident Command System
IPD	Initial Project Description
km	kilometre
m	metre
NIA	noise impact assessment
NRCAER	Northeast Region Community Awareness Emergency Response
NW	northwest
OGCA	<i>Oil and Gas Conservation Act</i>
OHS Act	<i>Occupational Health and Safety Act</i>
PEIM	Pressure Equipment Integrity Manual
Q2	second quarter
Q3	third quarter
QA/QC	quality assurance/quality control
QAES	Qualified Aquatic Environmental Specialist
RCMP	Royal Canadian Mounted Police

## SCREENING ASSESSMENT

# SALT CAVERN STORAGE EXPANSION PROJECT

ROW	.....	right-of-way
SA	.....	screening assessment
SW	.....	southwest
SWMP	.....	Stormwater Management Plan
tCO <sub>2</sub> e	.....	tonnes of carbon dioxide equivalent
TLU	.....	traditional land use
VC	.....	valued component
W3	.....	Wetland W3
W4M	.....	West of Fourth Meridian
WAIF	.....	wetland assessment impact form

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 1.0 SCREENING ASSESSMENT PURPOSE & OVERVIEW

### 1.1 Purpose

This screening assessment (SA) is a component of the ATCO Energy Solutions (AES) Detailed Project Description (DPD) and is intended to be read as an integrated aspect of the DPD. The DPD addresses the information requirements in the *Information and Management of Time Limits Regulations, Schedule 2* (Information Regulations), under the *Impact Assessment Act*, including the Project overview, location, components, activities, purpose, need, alternatives considered and regulatory framework and role of government. The DPD also provides geographic information on the Project, information on the physical environment, health, social and economic context of the Project and potential effects of the Project on the environment and on Indigenous groups. The purpose of the SA is to elaborate on the assessment of potential environmental effects and their mitigation and to evaluate the residual effects of the Project.

This SA qualifies and evaluates potential environmental, health, social and economic effects, and potential impacts on Indigenous peoples and rights of Indigenous peoples that may result from the construction or operation of the proposed Project. This SA also describes associated measures which eliminate, reduce, control or mitigate any potential adverse effects. It further discusses the potential for accidents or malfunctions that could potentially occur as a result of the Project and describes measures intended to eliminate, reduce, control or mitigate any associated effects. Finally, climate change resiliency (i.e. the effects of climate on the project) is discussed.

The assessments presented are based on the nature, complexity and context of the proposed Project, and are informed and guided by AES' direct engagement with stakeholders and the Summary of Issues statement provided by the Impact Assessment Agency of Canada (IAAC), which reflects concerns from the public, Indigenous groups, lifecycle regulators, jurisdictions, federal authorities and other interested parties.

The proposed Project is expected to commence construction in 2021 and operations in 2024. Operations are planned to continue for a period of 25 years, ceasing in 2049. Due to the uncertainty around decommissioning and reclamation standards by mid-century, the SA does not include decommissioning activities. Decommissioning, remediation, and reclamation will occur in accordance with the requirements of applicable law at the time and any approval conditions imposed by regulatory authorities. Details on AES' plans for decommissioning are described in Section 9 of the DPD.

### 1.2 Environmental Setting and Information Sources

The environmental setting for the Project is described in Section 14 of the DPD.

A site visit was conducted in summer 2020 to confirm the presence of wetlands and habitat conditions within SW 34-55-21-W4M, NW 27-55-21-W4M, and Lot 'D' NW 3455-21-W4M. This site visit is summarized in:

- ATCO Energy Solutions Ltd. – Heartland Proposed Natural Gas Liquids Development: Wetlands, Soils and Historical Resources Assessment (Golder 2020)

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

In addition to this wetland survey work, AES has reviewed and considered the applications and management plans developed in support of permitting the existing ATCO Strathcona Salt Cavern Storage Facility, which provide additional baseline data that has been used to characterize the Project conditions. These applications included:

- ATCO Energy Solutions Ltd. – An Energy Project Application for Operation of a Brine Pond and Associated Facilities: An Energy Project Approval Application under the Environmental Protection and Enhancement Act (Stantec 2014a)
- ATCO Energy Solutions Ltd. – Canadian Environmental Assessment Agency Project Description Strathcona Salt Cavern Storage Project (Stantec 2014b)
- ATCO Energy Solutions Ltd. – Salt Cavern Storage Project Baseline Hydrological Assessment (Stantec 2014c)
- ATCO Energy Solutions Ltd. – Salt Cavern Storage Project Stormwater and Groundwater Management Plan (Stantec 2014d)

Publicly available information reviewed for this assessment is referenced where applicable and aggregated in Section 9: References.

The environmental setting information is used to describe relevant context of potential Project-environment interactions for each indicator (refer to Section 2.3) assessed in Tables 6 through 18.

## 1.3 Stakeholder Issues

Engagement for the Project includes Indigenous Communities, regulatory agencies, property owners, residents and occupants and other stakeholders who may be affected by or otherwise have an interest in the Project. Engagement activities undertaken to date and planned for the remainder of the proposed Project are described in Sections 3 and 4 of the DPD.

AES' Initial Project Description (IPD) and Summary of the Initial Project Description were posted to the IAAC Registry in January 2021 and subject to a public review and comment period. IAAC provided a Summary of Issues arising in the public consultation period to AES on March 1, 2021. A response to the Summary of Issues detailing where each issue is addressed within the DPD or its Appendices is provided in Appendix A of the DPD. Where applicable, AES has also incorporated responses to the issues received into the SA.

AES is committed to working with all stakeholders throughout all phases of the proposed Project to ensure any issues are addressed and potential effects are appropriately mitigated, where practicable. AES has attempted to consider all concerns related to potential environmental and socio-economic effects of the proposed Project on Indigenous Communities and members of the public and will continue to work collaboratively with Indigenous Communities and key stakeholders to address concerns throughout the Project.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 2.0 VALUED COMPONENTS, PROJECT ACTIVITIES AND INDICATORS

### 2.1 Valued Components

Valued components (VCs) represent physical, biological, social and economic properties of the environment that are generally considered to be valued by society. For the purposes of this SA, VCs were selected based on the following:

- Guidance set out by IAAC in the Tailored Impact Statement Guidelines Template for Designated Projects Subject to the Impact Assessment Act (IAAC 2021).
- Environmental and socio-economic assessment requirements of the Alberta Environment and Parks (AEP) Standardized Terms of Reference for Industrial Plant Projects (AEP 2019).
- The possibility of the Project interacting with any VCs identified in the Impact Assessment Act as being within areas of federal jurisdiction.
- The presence of the VC in and around the Project area.
- The possibility of the Project interacting with a VC.
- Importance of a VC to Indigenous peoples and potential for effects to Indigenous interests or rights of Indigenous peoples.
- Stakeholder issues identified through AES's stakeholder engagement, comments received through the IAAC-led engagement on the IPD, and the Summary of Issues provided to AES by IAAC.

Typically in a screening-level assessment, VCs that have no effects pathway to other VCs or end points would not be assessed, especially in this case, where the Project is an expansion of an existing facility that included baseline data collection in support of a Project Description under Canadian Environmental Assessment Act, 2012 (CEAA 2012), and an Environmental Protection and Enhancement Act (EPEA) application under the Guide to Content for Energy Projects (AER 2017). However, AES made the decision to also screen VCs that are identified in the Impact Assessment Act as being or potentially being within areas of federal jurisdiction that normally would be screened out due to having limited potential to interact with the Project (e.g. fish and fish habitat) or that have no pathways to receptors or endpoints (e.g. human health).

As a result, the following VCs were selected for this SA:

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 1: Valued Components Selected for the Proposed Project

Category	Valued Component
Physical Environment	Air quality Noise Vibration
Aquatic Environment	Surface water Groundwater Fish and Fish Habitat, Aquatic Species
Terrestrial Environment	Geology Terrain and Soils Vegetation and Wetlands Terrestrial Wildlife and Migratory Birds
Human Environment	Heritage Resources Socio-economics Indigenous Peoples

## 2.2 Project Activities

VCs were evaluated against the planned Project activities identified for construction and operations phases and listed in Table 2. Project activities do not include accidents and malfunctions, which are discussed and evaluated separately in Section 6 of this document. Decommissioning activities are not included due to the anticipated timeline for decommissioning and uncertainty in what decommissioning technology and methods may be available at that time. Refer to Section 9 of the DPD for a discussion on decommissioning activities and Section 6 of the DPD for a discussion on expected options to achieve net-zero GHG emissions at the time of decommissioning.

Table 2: Project Activities associated with the Proposed Project

Construction Specific Activities	Operations Specific Activities
Vegetation clearing	Flaring
Soil salvage and stockpiling	Fugitive emissions
Grading and drainage	Stormwater management
Wetland/creek crossings	Vegetation management
Ground disturbance and excavation	Equipment operation
Drilling	Brine storage
Cavern mining	Brine disposal
Brine disposal	Operational rounds and maintenance
Construction traffic	Employment and procurement
Heavy equipment and earthworks	Operations activities <sup>1</sup>
Employment and procurement	
Waste storage and disposal	
Construction activities <sup>1</sup>	

<sup>1</sup>Construction activities and operations activities are respective aggregations of all the above-listed activities.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Where a linkage between VCs was noted, it is identified in Table 3. Typically, linkages that are broken during an assessment would not be assessed further, meaning that some VCs assessed below would not have otherwise been assessed in a typical screening assessment. Some VCs were eliminated where the linkage was broken through the SA and where there was reasonable confidence in the predicted effect. However, where some linkages were broken, potentially affected VCs that are identified in the Information Regulations or as being of concern to stakeholders during Project engagement have been included in the SA.

Some stakeholder concerns could not be screened because the mitigation measures identified for related VCs adequately eliminated the potential effect, or it was not possible to identify potential indicators that could be affected by Project activities. Although these VCs are not assessed in the screening tables presented in Section 4, AES has taken steps to address these concerns. Details on these concerns can be found as follows:

- Subsurface effects for product storage within the caverns (Refer to Section 9.42, 9.5, 12 and 18 of the DPD)
- Potential effects to human health, Indigenous health (i.e., ingestion of surface water and country foods), and sensitive ecosystems due to degradation of local and regional air quality (Refer to Section 12, 22 and 24 of the DPD for a description of how effects to health are not expected, and Section 4.1 below for the rationale to break the linkage)

Potential effects from accidents and malfunctions were not considered part of the normal course of doing business and are addressed in Section 6.

## 2.3 Indicators

An indicator is an aspect or characteristic of a criterion (i.e. a VC) that, if changed as a result of the Project, may demonstrate a physical, biological, social or economic effect. For the purposes of this assessment, the indicators were selected with consideration for the *Guide to Preparing Environmental Impact Assessment Reports in Alberta* (GoA 2013)

Indicators can be used to characterize changes to VCs in either a quantitative or qualitative manner. For the purposes of this SA, changes to indicators are characterized qualitatively. Qualitative assessment is based on professional judgment developed through review of data, written reports, and other information sources relevant to the Project. Indicators were determined through review of regulatory environmental applications prepared for the Strathcona Salt Cavern Storage Facility in 2014, concerns expressed by stakeholders, and professional judgment based on the proposed Project activities and physical works. A quantitative assessment of greenhouse gas (GHG) emissions is provided in Appendix C of the DPD.

Selected VCs, rationale for decision to include in the SA based on project activities, associated indicators and reference to the associated Screening Assessment Tables are presented in Table 3.



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 3: Rationale for Selected Valued Components Assessed in the Screening Assessment

Note: When indicators were assessed, the potential for residual effects was assessed for each indicator. Linkages between VCs were considered valid if the residual effect after implementation of mitigation measure could reasonably be foreseen to have an effect on other VCs. Linkages between VCs were considered invalid if mitigation measures were deemed to adequately mitigate or avoid a residual effect. As an example, the potential for an increase in dust and particulate matter was evaluated as part of the Air Quality VC to have no measurable residual effect. The linkage to Surface Water Quality and Vegetation and Wetlands was therefore considered invalid and effects as a result of dust and particulate deposition were considered invalid.

Some broken linkages were carried forward because potential effects to the VC are identified in the Impact Assessment Act as "effects within federal jurisdiction" (e.g., Fish and Fish Habitat). These VCs are indicated in Table 3 with a superscripted 1. Other VCs and indicators were included to address concerns expressed by stakeholders. These VCs and indicators are identified by a superscripted 2. Where linkages to these VCs were broken, they are noted in the Broken Linkage column.

Valued Component	Project Activities informing Rationale for Decision to Include in SA	Selected Indicators	Linked Valued Component(s)	Broken Linkages	Tables(s) where addressed in the SA
Physical Environment					
Air Quality	<ul style="list-style-type: none"> <li>Greenhouse gases (GHGs) must be quantified for all phases of a Project in accordance with Section 3 of the <i>Strategic Assessment of Climate Change</i> (2020).</li> <li>Project construction will use diesel-fueled vehicles and equipment.</li> <li>Project clearing and construction activities could introduce dust.</li> </ul>	<ul style="list-style-type: none"> <li>Dust and Particulate Matter</li> <li>GHG Emissions</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	Surface Water Vegetation and Wetlands Terrestrial Wildlife and Migratory Birds Human Health <sup>a)</sup> Indigenous Peoples Indigenous Health <sup>a)</sup>	Table 6
Noise and Vibration	<ul style="list-style-type: none"> <li>Construction activities may result in temporary increases to noise levels and vibration outside of the Project Site from construction traffic, heavy equipment, earthworks, and drilling.</li> <li>Additional noise emitting equipment (e.g., pumps) will be added to the Project Site.</li> <li>Increased traffic may occur periodically throughout operations during maintenance activities</li> </ul>	<ul style="list-style-type: none"> <li>Noise Emissions</li> <li>Sensory Disturbance (Vibration)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	Terrestrial Wildlife and Migratory Birds Human Health <sup>a)</sup> Indigenous Peoples Indigenous Health <sup>a)</sup>	Table 7 Table 8

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Valued Component	Project Activities informing Rationale for Decision to Include in SA	Selected Indicators	Linked Valued Component(s)	Broken Linkages	Tables(s) where addressed in the SA
Aquatic Environment					
Surface Water	<ul style="list-style-type: none"> <li>Project clearing and construction activities could alter drainage patterns at the Project Site and along the pipeline right-of-way (ROW).</li> <li>Drainage patterns will also be altered due to installation of impermeable surfaces.</li> <li>Pipelines to convey product to and from customers are expected to cross Astotin Creek and a number of wetlands including shallow open water.</li> <li>Stakeholder comment regarding water withdrawals from North Saskatchewan River for cavern mining</li> </ul>	<ul style="list-style-type: none"> <li>Surface Water Quantity</li> <li>Surface Water Quality</li> </ul>	<ul style="list-style-type: none"> <li>Groundwater</li> <li>Vegetation and Wetlands</li> </ul>	Fish and Fish Habitat <sup>1</sup> Terrestrial Wildlife and Migratory Birds <sup>1</sup> Human Health <sup>a)</sup> Indigenous Peoples Indigenous Health <sup>a)</sup>	Table 9
Groundwater	<ul style="list-style-type: none"> <li>Project clearing and construction activities will alter drainage patterns at the Project Site which could alter sub-surface flows.</li> <li>The construction of the brine pond will intersect the groundwater flow and temporarily affect the recharge of wetlands in the Project area.</li> </ul>	<ul style="list-style-type: none"> <li>Groundwater Quantity</li> <li>Groundwater Quality</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	Fish and Fish Habitat <sup>1</sup> Vegetation and Wetlands Terrestrial Wildlife and Migratory Birds Human Health <sup>a)</sup> Indigenous Peoples Indigenous Health <sup>a)</sup>	Table 10
Fish and Fish Habitat/Aquatic Species, Species at Risk <sup>1</sup>	<ul style="list-style-type: none"> <li>Fish and Fish Habitat as defined in subsection 2(1) of the <i>Fisheries Act</i> are identified in the <i>Impact Assessment Act</i> as being within the legislative authority of Parliament.</li> <li>Aquatic Species as defined in subsection 2(1) of the <i>Species at Risk Act</i> are identified in the <i>Impact Assessment Act</i> as being within the legislative authority of Parliament.</li> <li>The Project will not traverse any large-bodied fish-bearing water bodies.</li> <li>The Project is expected to traverse Astotin Creek, which is known to provide habitat to forage fish. The crossing point may not be fish-bearing due to seasonal low flows and beaver damming (Chen 2009).</li> </ul>	<ul style="list-style-type: none"> <li>Habitat Availability</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	Terrestrial Wildlife and Migratory Birds <sup>1</sup> Human Health <sup>a)</sup> Indigenous Peoples Indigenous Health <sup>a)</sup>	Table 11

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Valued Component	Project Activities informing Rationale for Decision to Include in SA	Selected Indicators	Linked Valued Component(s)	Broken Linkages	Tables(s) where addressed in the SA
Terrestrial Environment					
Geology <sup>2</sup>	<ul style="list-style-type: none"> <li>Drilling the wells will penetrate groundwater and other subsurface zones</li> </ul>	<ul style="list-style-type: none"> <li>Subsurface Communication</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	Surface Water Groundwater Human Health <sup>a)</sup> Indigenous Peoples Indigenous Health <sup>a)</sup>	Table 12
Terrain and Soils	<ul style="list-style-type: none"> <li>Project clearing and construction activities will alter soil distribution at the Project area and along the pipeline ROW.</li> <li>Drainage patterns will also be altered due to installation of impermeable surfaces which could alter soil erosion and distribution patterns.</li> <li>Soil will be stockpiled and conserved for remediation and reclamation activities.</li> </ul>	<ul style="list-style-type: none"> <li>Soil Quality</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	Vegetation and Wetlands Terrestrial Wildlife and Migratory Birds Human Health <sup>a)</sup> Indigenous Peoples Indigenous Health <sup>a)</sup>	Table 13
Vegetation and Wetlands	<ul style="list-style-type: none"> <li>The Project will be sited on land that is currently used for AES' existing Strathcona Salt Cavern Storage Facility and may, pending final layout, extend into NW 27-55-21 W4M (i.e. to the south of the existing site) or Lot 'D' in NW 34-55-21 W4M (i.e. to the north of the existing site).</li> <li>Wetlands are located within the Project Site (refer to Figure 1).</li> <li>Pipelines to convey product to and from customers will cross Astotin Creek and a number of wetlands including shallow open water. Wetland health has to the potential to be affected by construction and operation activities. The excavation of the brine pond and trenching for the pipelines will interact with the water table and temporarily affect the groundwater flow which feeds these wetlands.</li> </ul>	<ul style="list-style-type: none"> <li>Ecosystem Availability</li> <li>Ecosystem Quality</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	Terrestrial Wildlife and Migratory Birds Human Health <sup>a)</sup> Indigenous Peoples Indigenous Health <sup>a)</sup>	Table 14

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Valued Component	Project Activities informing Rationale for Decision to Include in SA	Selected Indicators	Linked Valued Component(s)	Broken Linkages	Tables(s) where addressed in the SA
Terrestrial Wildlife and Migratory Birds	<ul style="list-style-type: none"> <li>Migratory birds as defined in subsection 2(1) of the <i>Migratory Birds Convention Act, 1994</i> are identified in the <i>Impact Assessment Act</i> as being within the legislative authority of Parliament.</li> <li>The Project Site is located in the heavily industrialized Alberta Industrial Heartland which has low potential habitat value for wildlife, however, the Project Site is adjacent to and a portion of the existing Strathcona Salt Cavern Storage Facility overlaps a Key Wildlife Biodiversity Zone.</li> <li>Migratory birds use wetlands in the Project Site.</li> <li>Construction activities may result in temporary sensory disturbance to wildlife and may cause accidental wildlife mortality (e.g. vehicle strikes).</li> </ul>	<ul style="list-style-type: none"> <li>Habitat Availability</li> <li>Survival &amp; Reproduction</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	Indigenous Peoples Indigenous Health <sup>a)</sup>	Table 15
Human Environment					
Heritage Resources	<ul style="list-style-type: none"> <li>Although no historical resources have been identified on the Project Site to date, there have been historical resources discovered to the west of the site and in the area near where the pipelines are proposed to be routed.</li> <li>Potential for the Project footprint to extend into the northern area of NW 27-55-21 W4M (i.e. to the south of the existing site) or Lot 'D' in NW 34-55-21 W4M (i.e. to the north of the existing site) and along the pipeline ROW may result in interaction with historical resources.</li> </ul>	<ul style="list-style-type: none"> <li>Archaeological, cultural or paleontological potential</li> </ul>	<ul style="list-style-type: none"> <li>Indigenous Peoples</li> </ul>	None	Table 16
Socio-economics	<ul style="list-style-type: none"> <li>The Project has the potential to provide positive effects (benefits) to the local economy, particularly during construction.</li> <li>Local/regional health, social and economic conditions have the potential to be affected by the Project.</li> </ul>	<ul style="list-style-type: none"> <li>Procurement</li> <li>Capacity of emergency and protective services</li> <li>Availability of temporary accommodation</li> <li>Wellbeing of vulnerable populations</li> </ul>	<ul style="list-style-type: none"> <li>Indigenous Peoples</li> </ul>	None	Table 17

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Valued Component	Project Activities informing Rationale for Decision to Include in SA	Selected Indicators	Linked Valued Component(s)	Broken Linkages	Tables(s) where addressed in the SA
Indigenous Peoples	<ul style="list-style-type: none"> <li>Impacts to the health, social and economic conditions of Indigenous Peoples are identified in the <i>Impact Assessment Act</i> as being “effects within federal jurisdiction”.</li> <li>Impacts to traditional land and resource use and physical and cultural heritage of Indigenous Peoples are identified in the <i>Impact Assessment Act</i> as being “effects within federal jurisdiction”.</li> </ul>	<ul style="list-style-type: none"> <li>Indigenous current use of lands for traditional purposes</li> <li>Indigenous archaeological and cultural resources</li> <li>Acoustic and visual environment</li> <li>Procurement and employment</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	None	Table 18

<sup>a)</sup> All linkages to Human Health and Indigenous Health were broken and no potential effects to indicators for these VCs were identified. Neither human Health nor Indigenous Health were assessed as VCs. Refer to Section 24 of the DPD for additional information on air emissions and potential effects to the health of the general public and Indigenous land users.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

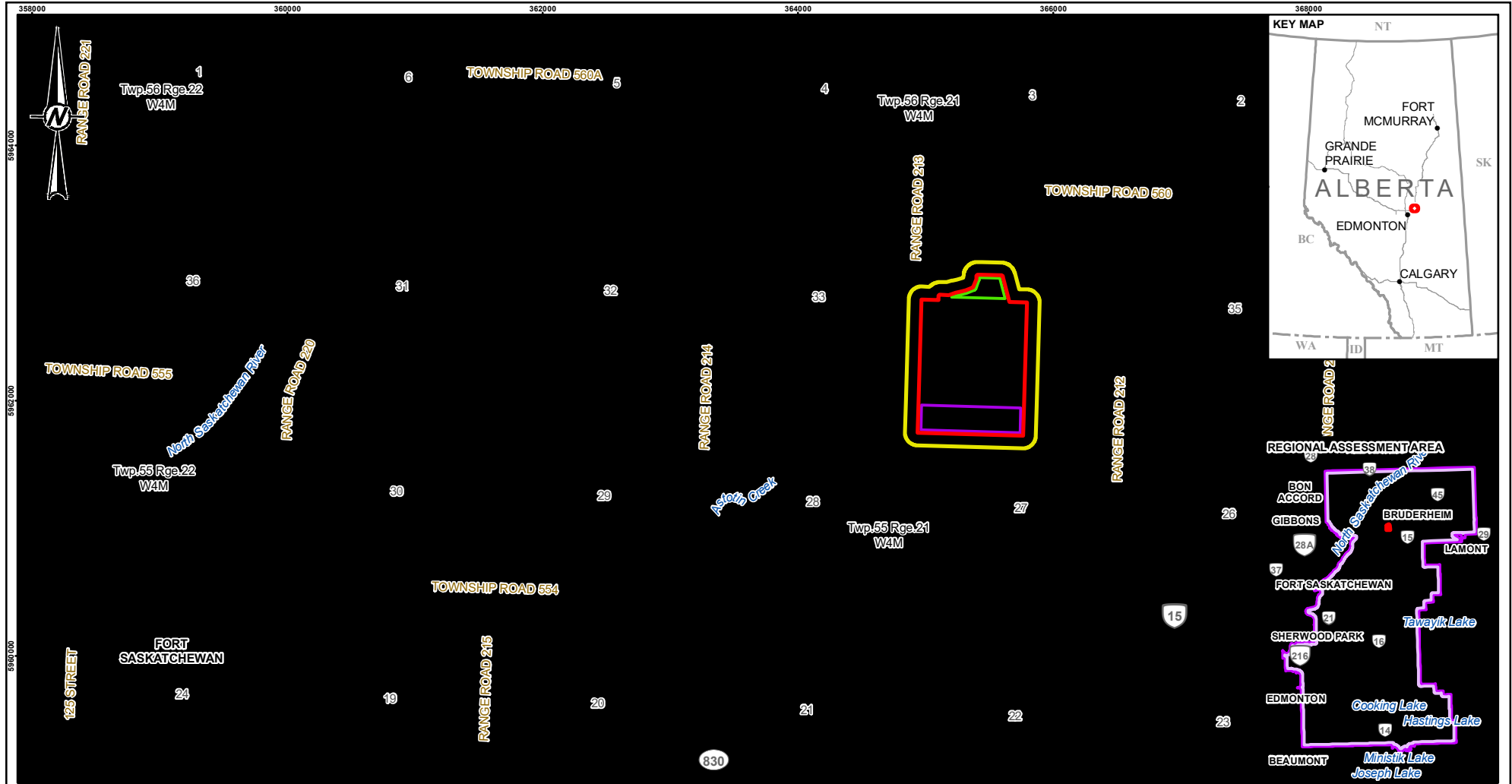
## 2.4 Spatial and Temporal Boundaries

### Spatial Boundaries

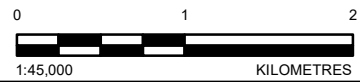
Due to the qualitative nature of the assessment, a single set of assessment areas were established for all VCs. These boundaries were set in consideration of the ecological and socio-economic context of the Project. The Project has a relatively small footprint, is located on freehold land, and has limited emissions. As a result, the following assessment areas were set to define the Project footprint and characterize the local and regional assessment areas. The boundaries were set in consideration of potential effects and the typical extent of potential effects in similar Project types, including operational data from the existing Strathcona Salt Cavern Storage Facility. The assessment areas represent the boundaries of where the potential effect could extend. The areas are defined in Table 4 and shown in Figure 1. The predicted effects to VCs typically associated with each spatial boundary are discussed in the Rationale column.

Table 4: Spatial Boundaries for Effects Assessment

Spatial Boundary	Description	Rationale
<b>Project Site</b>	<ul style="list-style-type: none"> <li>The boundary around SW 34-55-21-W4M</li> <li>The centre line of the pipeline ROW plus a 5 metre buffer on each side of the centre line (note that this pipeline ROW is not depicted on Figure 1)</li> <li>The northernmost 20 hectares of NW 27-55-21-W4M (project option)</li> <li>5 hectares of Lot D NW 34-55-21-W4M (project option)</li> </ul>	Designated to capture the potential direct effects on the footprint of the Project
<b>Local Assessment Area</b>	<ul style="list-style-type: none"> <li>Includes the Project Site; and</li> <li>Extends approximately 100 metres outside the boundary of the Project Site, including the pipeline ROW</li> </ul>	Designated to capture the potential direct effects of Project activities and immediate indirect effects (e.g. fugitive dust that could be generated by Project activities). The local assessment area is considered large enough to capture many effects on the physical environment, aquatic resources, and terrestrial resources.
<b>Regional Assessment Area</b>	<ul style="list-style-type: none"> <li>Includes Strathcona County and the contiguous areas of the Alberta Industrial Heartland that extend outside of the boundaries of Strathcona County, including the City of Fort Saskatchewan</li> </ul>	Designated to capture potential direct and indirect effects of Project activities. The regional assessment area is considered large enough to capture the potential effects of the Project on air quality, socio-economic activities, and the ability of Indigenous Peoples to participate in Project activities, practice traditional land and resource use and to exercise their rights.



- |  |                              |  |                          |
|--|------------------------------|--|--------------------------|
|  | OPTIONAL - LOT D             |  | ELEVATION CONTOUR (10 M) |
|  | OPTIONAL - NW 27-55-21 W4M   |  | PRIMARY HIGHWAY          |
|  | PROJECT SITE                 |  | SECONDARY HIGHWAY        |
|  | LOCAL ASSESSMENT AREA (100M) |  | LOCAL ROAD               |
|  | REGIONAL ASSESSMENT AREA     |  | RAILROAD                 |
|  |                              |  | WATERCOURSE              |
|  |                              |  | POPULATION CENTRE        |
|  |                              |  | WATERBODY                |



CLIENT	ATCO ENERGY SOLUTIONS		
CONSULTANT		YYYY-MM-DD	2021-03-31
		DESIGNED	SL
		PREPARED	NF
		REVIEWED	CES
		APPROVED	DV

**REFERENCE(S)**  
RAILROADS, LOCAL ROADS AND HIGHWAYS, WATERCOURSES AND WATERBODIES OBTAINED FROM GEOGRATIS. © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. CONTOURS AND POPULATED PLACES © GOVERNMENT OF ALBERTA 2020. ALL RIGHTS RESERVED. LAND USE ZONING OBTAINED FROM LAND USE BYLAW 6-2015 LAND USE DISTRICT MAPS, STRATHCONA COUNTY.  
PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT  
**PROPOSED ATCO SALT CAVERN STORAGE EXPANSION PROJECT**  
TITLE  
**PROJECT SITE, LOCAL AND REGIONAL ASSESSMENT AREAS AS PRESENTED IN THE SCREENING ASSESSMENT**

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM ANS/A

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## Temporal Boundaries

The construction and operations phases of the Project are assessed in the SA, as described below:

- **Construction phase:** The period from the start of construction to the start of operation, scheduled to begin in mid-to late 2021 and end in 2024 after construction cleanup is completed.
- **Operations phase:** Encompasses operation and maintenance activities throughout the operating life of the Project (25 years). The Project has a planned in-service date in 2024.

The assessment identifies what phase of the Project an indicator is predicted to occur. Effects related to decommissioning are not assessed as part of this SA as decommissioning is a far-future scenario. At the time of decommissioning, it is expected that AES will review and consider current options, issues, and regulatory requirements, in consultation with appropriate regulatory authorities, Indigenous Communities, and affected stakeholders with an interest in the proposed works. Approvals from applicable authorities will be obtained before decommissioning activities are initiated.

## 3.0 SCREENING ASSESSMENT PRESENTATION & METHODOLOGY

### 3.1 Screening Assessment Presentation

The SA, provided in Section 4.0, is presented by VC. Each VC Table presents and assesses the indicators that have the potential to be affected by Project activities. A separate table is then provided for each VC, which includes the following information.

The SA includes the following information:

- Indicator, identified as per section 2.3.
- Project Specific Activities, as per Table 2, for construction and operation activities that interact with the VC.
- Description of potential project interaction (pathway), which defines how the Project interacts with the VC. This includes a summary of the Project setting/context to support assessment of the potential effect.
- Mitigation measures that AES will implement (existing or new), to eliminate, minimize, control or offset any adverse effects to the VC from the proposed Project, as per section 3.2.2. This includes inspection and monitoring that AES will perform to support mitigation measures, where applicable, and comply with existing regulatory processes in place to minimize effects to the VC.
- Residual Effect Characterization and predicted significance, evaluated based on potential project interaction and effect of mitigation measures (including inspection and monitoring), as per section 3.2.3.



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 3.2 Screening Assessment Methodology

A step-wise approach was used to assess the potential effects of the Project. Following identification of VCs, indicators, project works and activities, the following were completed:

- i. Identification of potential pathways and interactions between VCs, indicators, project works and activities (as per section 3.2.1).
- ii. Identification of technically and economically practicable mitigation measures including context on mitigation measures required by existing regulatory processes or terms and conditions of existing or anticipated regulatory approvals (as per section 3.2.2).
- iii. Prediction of residual effects following implementation of mitigation measures, including evaluation of their expected significance (as per section 3.2.3) in relation to the existing physical and social environment.
- iv. Prediction of any residual effects following implementation of mitigation measures having an effect on a VC downstream (linkage). If the residual effect could have no effect on another VC, the linkage was considered broken (as per section 2.2 and the introduction to Table 3. Recall, some VCs were evaluated even if the linkage was broken).

### 3.2.1 Identification of Potential Pathway and Description of Project Setting/Context

The SA considered potential interactions between the Project components and activities and the VCs. These project-VC interactions have the potential to result in effects, which are changes to the environment, health, social, or economic conditions as a result of Project activities.

Potential effects to indicators were introduced and contextualized to describe the potential effect and how Project activities may interact with the natural or socio-economic environment to induce the effect. The Project context provides additional information when activities may occur within a phase of the Project, as well as to contextualize how and when the conditions that could result in an effect may be encountered or why it is unlikely that effects will occur.

Potential effects of the Project on VCs were determined by comparing the baseline and ecological setting data and conditions to those expected to result from the construction and operation of the Project. Potential effects were described for each VC. The potential effects after implementation of mitigation measures were characterized as per Section 3.2.3.

### 3.2.2 Identifying Technically and Economically Practicable, or Existing Regulatory Mitigation and Management Measures

After potential pathways and interactions were identified, technical and economically practicable mitigation measures and mitigation measures required by existing regulatory mechanisms or processes, or by terms and conditions of existing or anticipated regulatory approvals to avoid or minimize potential negative effects or enhance positive effects were applied. This also included identification of existing or anticipated inspection and monitoring activities. Mitigation measures will continue to be identified and defined through Project construction and operation as specific activities and operations are defined. Additionally, the Project will be regulated by existing and amended environmental regulatory approvals.

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The existing Strathcona Salt Cavern Storage Facility is regulated by the Alberta Energy Regulator (AER) under the Environmental Protection and Enhancement Act (EPEA), the Oil and Gas Conservation Act (OGCA), the Pipeline Act, the Pipeline Rules, the Water Act, and the Water (Ministerial) Regulation, and is required to comply with various AER Directives. Provincial and municipal regulatory authority over proposed Project (and where applicable, the existing Strathcona Salt Cavern Storage Facility) is discussed in further detail in Section 18 of the DPD. Planned inspection and monitoring activities are also discussed in Section 18 of the DPD.

There are at least 12 cavern storage projects operating in Alberta under the jurisdiction of the AER, including AES' existing Strathcona Cavern Storage Facility. The effects from such projects, both surface and subsurface, as well as effective mitigation measures, are well understood by proponents and regulators in Alberta.

The majority of the proposed environmental protection measures and mitigation measures outlined below are typical for industrial projects and Class II pipelines. The mitigation measures below do not preclude any additional mitigation measures or commitments that will result from Project execution or commitments made as a result of ongoing engagement activities with Indigenous Communities, stakeholders and other interested parties. These mitigation measures also do not preclude applicable environmental approval commitments and conditions that will be imposed in respect of the Project.

AES commits to the mitigation measures described to avoid, eliminate, or mitigate potential adverse effects from the proposed Project. Mitigation measures will be adhered to by AES employees and will be provided in contract specifications to be adhered to by applicable contractors during the construction and operation phases of the Project. Where applicable, and as required by existing or amended regulatory approvals, inspection and monitoring will be conducted to confirm the anticipated effectiveness of mitigation measures.

AES will be responsible for ensuring that mitigation measures are implemented as described, and contingency plans are developed and applied when an unexpected environmental condition or resource (e.g. wildlife feature of concern, archaeological resource) is encountered. AES will ensure that applicable contractors are aware of and committed to implementing the mitigation measures described in this SA and will routinely monitor conformance. Construction mitigation measures will also be included in the Project-specific Environmental Protection Plan. Operations mitigation measures will be integrated into AES's existing management systems, and operational and environmental policies and procedures.

### 3.2.3 Predicting and Characterizing Residual Effects and their Significance

A residual effect is an environmental or socio-economic effect of a project and associated activities that is predicted to remain after the application of mitigation measures. A residual effect is considered to occur where anticipated future conditions resulting from undertaking the Project are different from the conditions otherwise expected from natural change.

During the completion of this SA, some VCs were predicted to result in negligible or no measurable effect or change even without the application of mitigation measures (e.g. effects to fish and fish habitat, water withdrawals from the North Saskatchewan River). However, these VCs were screened, and mitigation measures presented because these VCs were of concern to project stakeholders or are identified in the Impact Assessment Act as being within areas of jurisdiction of the federal government.

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The following factors were considered, in combination with the ecological and project context, to assess the presence of residual effects from the activities associated with the proposed Project.

- Geographic extent of the residual effect – assessed as limited to the Project Site, Local or Regional Assessment Areas, as per Table 4.
- Reversibility – assessed as reversible within the lifetime of the Project, partially reversible within the lifetime of the Project, or irreversible.
- Duration – assessed as short-term or temporary (generally limited to construction or early operation), medium term (generally the operating life of the facility or the construction and operation phases) or long term (extends from construction or operation to beyond decommissioning).
- Frequency – assessed as unlikely to occur, infrequent, intermittent, frequent or continuous.

Context is also relevant when describing a residual effect on physical environmental or socio-economic criteria. Physical context is related to the potential for environmental effects to cause disruption of current (i.e. baseline) functions in relation to the receiving environment. Socio-economic context is also helpful in understanding the ability of an existing community to absorb and adapt to changes that may occur as a result of the Project.

Based on assessment of the combination of the factors above in conjunction with the ecological and project context, residual effects were predicted. The following table provides the guidance that was used in assessing and determining residual effects.

Table 5: Residual Effect Characterization

Residual Effect	Input into Characterization
<b>No Measurable Residual Effect</b>	No measurable effect; or Mitigation measures described were predicted to eliminate any measurable effect.
<b>Residual Effect - Minor</b>	Mitigation measures described were predicted to mitigate or minimize but will not fully eliminate a potential effect  Effects were generally reversible, short-term, unlikely or infrequent/intermittent; effects, if negative in direction, were generally limited to the Project Site or considered negligible if they extended beyond the Project Site;  Existing regulatory mechanisms and oversight in place and monitored by existing Regulator(s)

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Residual Effect	Input into Characterization
<b>Residual Effect - Moderate</b>	<p>Mitigation measures described were predicted to reduce a potential effect but not eliminate a potential effect</p> <p>Effects were partially reversible and generally up to medium-term, intermittent or frequent; effects, if negative in direction, were expected to reach the Local or Regional Assessment Area</p> <p>Existing regulatory mechanisms partially in place or reliant on industry best practices; No or partial existing oversight to approve proposed mitigations and monitor indicator; however, industry best practices are followed</p>
<b>Residual Effect - Major</b>	<p>No mitigation measures described, or mitigation measures described had no or limited influence on potential effect</p> <p>Effects were irreversible and generally long-term, frequent or continuous; effects, if negative in direction, were expected to reach the Regional Assessment Area</p> <p>Existing regulatory mechanisms not in place, no or limited industry best practices in place</p>

A potential effect that was eliminated or considered unlikely after application of mitigation measures was identified as having no measurable residual effect. An effect or potential effect that remained following the application of mitigation measures was identified as a residual effect and was further evaluated for its significance.

Where a residual effect or potential residual effect was predicted, it was characterized based on the four factors (described above), which were used to support determining significance – its geographic extent; its reversibility; the duration/frequency of exposure to the related project activity; and the effectiveness of planned mitigation measures. These factors ultimately assess both the effect and its probability.

The factors of significance were considered together along with the existing ecological context to estimate overall effects from the Project. Predicted changes in indicators for a residual effect provide the foundation for determining the significance of residual effects of the Project on the criteria. As much as possible, residual effects were characterized, and significance assessed using established guidelines and screening values. The approach was refined due to the qualitative nature of the assessment and use of existing and public data.

The Project components and activities presented are conservative and the assessment assumes the largest foreseeable Project effect on the associated VCs. AES will continue to evaluate mitigation measures throughout the lifecycle of the Project.

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## 4.0 SCREENING ASSESSMENT

### 4.1 Physical Environment

Table 6: Physical Environment – Air Quality

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<b>Dust and Particulate Matter</b>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Soil salvage and stockpiling</li> <li>Heavy equipment and earthworks</li> <li>Construction traffic</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>N/A</li> </ul>	<p>The Project may increase dust and particulate matter in the Local Assessment Area as a result of construction activities. An increase in dust and particulate matter related to construction equipment exposing soil surfaces to the atmosphere is expected.</p> <p>Direct Project emissions will largely be confined to the Construction Phase, where emissions and dust will be generated through the use of on- and off-road construction equipment.</p> <p>Diesel will be used to fuel the on- and off-road equipment that will be used during the construction phase, which is typical of construction activities today. Construction will also require soil stockpiling and exposure of bare surfaces, which could increase the amount of dust and particulate matter in the air.</p> <p>Although there is potential for an increase in dust, the Project will not have emissions that could deposit atmospheric contaminants to the surrounding environment and there are no potentially acidifying substances that will be emitted by the Project that could degrade surface water, vegetation and wetlands, or wildlife habitat.</p> <p>The Project is not anticipated to have dust and particulate matter emissions during the operations phase, as soil stockpiles will be vegetated and there are no earthworks planned as part of Project operations.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Project personnel will be required to turn off vehicles and equipment when not in use and idling will be minimized.</li> <li>Equipment used for construction will be well-maintained. If equipment appears to be malfunctioning, releasing an unusual odour, or another indication that a machine may not be fully functional is observed, the machine will be inspected, and any damage will be repaired prior to returning to service.</li> <li>Dust control measures (e.g., spraying water) will be implemented and will be completed in accordance with the requirements of the Environmental Inspector.</li> <li>Compatible vegetation will be retained where practicable on areas prone to wind erosion, steep slopes, drainage ways, or near wetlands and water bodies.</li> <li>Debris generated as a result of Project construction activities will not be burned.</li> <li>Soil stockpiles will be seeded following construction to control dust and erosion.</li> <li>If a complaint from a resident is received, AES will engage a qualified person to check real-time concentrations near the residence using a hand-held monitor and comparing the results to ambient air quality criteria.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>Any effects of dust and particulate matter are expected to be minor, <b>short-term, intermittent</b> and <b>reversible</b>. It is unlikely that a potential measurable change or effect to air quality from use of diesel as a result of project construction activities will occur as construction activities will be staggered and use of on- and off-road construction vehicles will occur intermittently over the construction period.</p> <p>The effect was considered to be <b>localized</b> to account for wind patterns; however, an increase in dust and particulate matter from diesel vehicles is <b>unlikely</b> to be noticeable or measurable outside of the Project Site. AES will have a soil handling contingency plan that will address measures to take during high winds or other conditions when soil handling may increase the likelihood of dust and particulate matter. While <b>existing regulatory mechanisms</b> are in place, AES is not expected to exceed any emissions thresholds that would require additional air monitoring or mitigation during the construction period. AES currently complies with federal and provincial regulatory management conditions for protection of air quality.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 6: Physical Environment – Air Quality

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<b>Greenhouse Gas Emissions</b>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Heavy equipment and earthworks</li> <li>Construction traffic</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>Flaring</li> <li>Fugitive emissions</li> </ul>	<p>The Project may increase greenhouse gas (GHG) emissions as a result of construction and operations activities.</p> <p>GHG emissions will be largely limited to the Construction Phase, where emissions will be generated through the use of on- and off-road construction equipment and potentially through land clearing should Lot D be utilized (pending final design). (Estimates provided include land clearing and conservatively assume burning of cleared materials although these materials will not be burned).</p> <p>Minimal air emissions are predicted during Project operations. The Project is a hydrocarbon storage Project and will offer storage to customers in the area. The only direct source of GHG emissions during the Operations Phase will be intermittent flaring emissions during upset or maintenance conditions and minimal fugitive emissions from Project process piping.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>AES will comply with the Air Quality terms and conditions defined in Section 3 of its existing Environmental Protection and Enhancement Act (EPEA; GoA 2020a) Approval 357248-00-01, as amended for the proposed Project.</li> <li>Project personnel will be required to turn off vehicles and equipment when not in use and idling will be minimized.</li> <li>Equipment used for construction will be well-maintained. If equipment appears to be malfunctioning, releasing an unusual odour, or another indication that a machine may not be fully functional is observed, the machine will be inspected, and any damage will be repaired prior to returning to service.</li> <li>Debris generated as a result of Project construction activities will not be burned.</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>AES will comply with the Air Quality terms and conditions defined in Section 4 of its existing EPEA Approval 357248-00-01, as amended for the proposed Project and its AER Approved Facility Licence.</li> <li>The Project will be designed to minimize fugitive emissions.</li> <li>AES will complete reporting of flaring events in accordance with Section 8.2(1) of Directive 060: Upstream Petroleum Industry Flaring, incinerating, and Venting (AER 2020).</li> </ul>	<p><b>Residual Effect - Minor</b></p> <p>The direct GHG emissions estimated during the Construction Phase are <b>short term, intermittent</b> and <b>reversible</b>, and are estimated at 10,699.24 tCO<sub>2</sub>e, of which the emission from off-road equipment accounts for approximately 52% of total construction emissions. An additional 1,593.30 t CO<sub>2</sub>e per year are estimated to occur during the Operations Phase as a result of intermittent flaring and fugitive emissions. The emissions will be <b>short term, intermittent, and reversible</b>.</p> <p>The dispersion of GHG emissions was considered to be <b>regional</b> to account for wind patterns. <b>Existing regulatory mechanisms</b> are in place. AES currently complies with federal and provincial regulatory management conditions for management and reporting of GHG emissions and protection of air quality.</p>

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Table 7: Physical Environment – Noise

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<p><b>Noise emissions</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Heavy equipment and earthworks</li> <li>• Construction traffic</li> <li>• Drilling</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• Equipment operation</li> </ul>	<p>The Project may increase noise levels in the Local Assessment Area.</p> <p>Noise emissions from the Project are expected during the Construction Phase. With the exception of drilling and some civil works, construction activities will be limited to daytime. Some civil works may extend to two shift operations but are not planned to be continuous. Drilling typically must occur continuously.</p> <p>The Project is in an area zoned for heavy industrial use and AES has confirmed that it is exempt from noise bylaws requiring no activity after 22:00.</p> <p>Noise emissions from the Project will be regulated by the AER and will be required to meet the requirements of Directive 038: Noise Control (AER 2007).</p> <p>Without the implementation of technically and economically practicable mitigation measures, noise may exceed allowable noise levels at nearby receptors.</p> <p>The Strathcona Salt Cavern Storage Facility is currently operating within permissible sound levels and additional noise control is not required at this time (Patching 2020).</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will comply with the requirements of Directive 038: Noise Control (AER 2007) regarding construction noise including:               <ul style="list-style-type: none"> <li>○ Construction activities will typically occur between 07:00 and 22:00 to reduce the potential effect of construction noise.</li> <li>○ If a significant or longer duration noise-causing activity is planned, AES will advise nearby residents and schedule the activity to reduce disruption to nearby residents.</li> <li>○ All internal combustion engines used for construction will be fitted with appropriate muffler systems.</li> <li>○ Where practicable, Project personnel will complete noise-emitting activities where existing buildings and developments on the Project Site may shield dwellings in the local assessment area from construction equipment noise.</li> </ul> </li> <li>• If a complaint is received regarding noise during construction, AES will respond expeditiously and take appropriate action to ensure that the issue has been managed responsibly.</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will complete a Noise Impact Assessment (NIA) in accordance with AER Directive 038 – Noise Control. The NIA will address the guidance provided in Health Canada’s Guidance for Evaluating Human Health Impacts in an Environmental Assessment (Health Canada 2016).</li> <li>• If the NIA indicates that the Project will not meet the compliance thresholds, AES will install additional noise attenuation measures.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>No residual effect is predicted as a result of noise levels at the Project Site. AES has operated the existing Strathcona Salt Cavern Storage Facility since 2016 and has received no noise complaints or feedback from the public regarding noise levels. The existing facility is operating within permissible sound levels and no additional noise control is required. Noise dampening technology is well understood and if an exceedance is noted during operation of the Project, noise dampening equipment will be installed.</p> <p>The Project Site is near an existing Industrial Complex and the Alberta Industrial Heartland 2018 Regional Noise Model shows that noise effects from this Complex overlap the existing site.</p> <p>A slight increase in noise emissions is predicted to occur during the Construction Phase due to increased activity on the site and the addition of on- and off-road construction equipment. This noise will be <b>short-term, intermittent</b> and limited to the <b>local area</b> and <b>reversible</b>. Given the Project location, a noticeable increase in noise emissions is not predicted. <b>Existing regulatory mechanisms</b> are also in place to ensure noise levels remain in compliance.</p>

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Table 8: Physical Environment – Vibration

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<b>Sensory disturbance (Vibration)</b>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Heavy equipment and earthworks</li> <li>Construction traffic</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>N/A</li> </ul>	<p>Project construction activities may cause vibrations that are felt outside of the Project Site in the Local Assessment Area.</p> <p>Transport of heavy equipment and use of heavy equipment and pile driving may cause vibrations that are felt off-site in the Local Assessment Area.</p> <p>The Project has no planned installation of equipment that would cause or contribute to vibration during the Operations Phase.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>If a significant vibration-causing activity is planned, AES will advise nearby residents and schedule the activity in consultation with Strathcona County and local residents to reduce disruption to nearby residents.</li> <li>The Project will not require the use of blasting.</li> <li>Directive 038: Noise Control (AER 2007) requires that proponents must take care to reduce effects of vibration to the receiving environment.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>No measurable residual effect is predicted as a result of vibration during construction. Vibration expected as a result of transport of heavy equipment or pile driving is expected to be <b>limited to the Project Site</b>.</p> <p>If an effect occurs within the Project Site, it is predicted to be <b>short-term, intermittent</b> and <b>reversible</b> and will be managed through <b>best industry practices</b>. Vibration is adequately managed through Project design and planning during construction.</p>



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## 4.2 Aquatic Environment

Table 9: Aquatic Environment – Surface Water

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
Surface water quantity	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Vegetation clearing</li> <li>Grading and drainage</li> <li>Heavy equipment and earthworks</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>Stormwater management</li> </ul>	<p>There is potential for changes to land cover (i.e. reduced vegetative cover) to alter runoff rates and runoff volumes, resulting in increased water levels and erosion-sedimentation at receiving water bodies at the Project Site, which could alter the catchment area.</p> <p>The Project surface facilities will be situated around Wetland W3, which is currently used for stormwater/runoff management at the Project Site for the existing Strathcona Salt Cavern Storage Facility. There is potential that removal of vegetative cover could negatively affect the catchment area of receiving water bodies without the implementation of technically and economically practicable mitigation measures.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>AES will engage a qualified Engineer to develop grading and elevation plans.</li> <li>AES will develop and implement an Erosion and Sedimentation Control (ESC) Plan that will:               <ul style="list-style-type: none"> <li>Be based on soil erodibility, vegetative cover, topography and climate.</li> <li>Appropriately divert and direct runoff, including installation of sediment barriers.</li> <li>Include construction-specific procedural requirements.</li> <li>Comply with the requirements of EPEA (EPEA; GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b) to prevent erosion and sedimentation</li> <li>Comply with existing site approval under the <i>Water Act</i> (GoA 2017) for utilizing W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion.</li> <li>Comply with the existing EPEA Approval requirements for erosion and sediment control, including any applicable amendments as a result of the proposed Project.</li> </ul> </li> <li>Comply with Strathcona County requirements for an ESC Report for construction activity.</li> <li>AES will ensure ESC measures remain in place until the construction activities are completed and the disturbed area has been stabilized, restored, and where required, revegetated. This includes re-establishing vegetation around the brine pond berms and wetland W3.</li> <li>Known site-specific features (e.g., wetland, water body) and associated setbacks will be clearly marked on Environmental Alignment Sheets and access and construction environmental maps and flagged prior to the start of clearing activities.</li> <li>Construction cleanup and revegetation will be completed under non-frozen conditions where practicable.</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>AES will comply with the approval conditions in EPEA Approval 357248-00-01, as amended, regarding discharge of storm and groundwater into Wetland W3. Refer to Appendix D for AES' current EPEA Approval.</li> <li>Site grading and drainage will be designed to direct runoff to Wetland W3 (existing approved stormwater management facility) within the existing Project Site.</li> </ul>	<p><b>Residual Effect – Minor</b></p> <p><u>Construction:</u> Implementation of identified plans and programs are expected to contain disturbed areas and reduce the likelihood of and limit any effect of erosion-sedimentation at receiving water bodies.</p> <p>Grading and contouring of the Project Site will result in a decrease in available land cover and an increase in impermeable surfaces, which could result in an increase in runoff rates and volumes within the Project Site which will be directed to an approved stormwater management facility, managed by <b>existing regulatory mechanisms</b>. This effect will be <b>limited to the Project Site</b>.</p> <p>The increase in these sedimentation processes would be <b>intermittent</b>. Precipitation events or high wind conditions could contribute to the potential for the effect to occur.</p>

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Table 9: Aquatic Environment – Surface Water

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
			<ul style="list-style-type: none"> <li>• AES will update and implement its ESC plan for ongoing operations to ensure compliance with the requirements of EPEA (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b), and the existing site approval under the <i>Water Act</i> (GoA 2017) for utilizing Wetland W3 as a stormwater management facility.</li> <li>• AES will update and implement its existing Stormwater Management Plan (SWMP) to ensure compliance with EPEA (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b), and existing and amended EPEA and <i>Water Act</i> approvals for utilizing Wetland W3 as a stormwater management facility and to effectively manage drainage.</li> <li>• Based on final project layout of the proposed Project, if runoff from a component of the Project cannot practicably be directed to Wetland W3 (e.g. due to surface infrastructure siting), AES will design, apply for, and obtain regulatory approval for additional stormwater management facilities from the AER and Strathcona County.</li> <li>• Mechanisms to draw down increased volumes above high water mark at onsite Wetland W3 are in place as approved by the AER under existing EPEA and <i>Water Act</i> approvals. Any alterations to these methods will be conducted in accordance with existing regulatory approvals and approvals will be amended if these mechanisms are to be altered.</li> <li>• AES will, as per EPEA Approval amendments, update the existing approved Groundwater Monitoring Program, Wetland W3 Monitoring Program and Industrial Wastewater and Runoff Program and implement any required changes to ensure compliance with approval amendments. This includes additional inspection, monitoring and reporting requirements for the new infrastructure.</li> </ul>	<p><u>Operation:</u> Changes to runoff rates due to the increase in impermeable surfaces at the Project Site may result in increased streamflow or water levels in onsite wetland (i.e. at the Project Site). Implementation of identified plans and programs and revegetation and monitoring are expected to reduce the likelihood of and limit any effect of erosion-sedimentation at the onsite wetland. This potential effect will be managed through <b>existing regulatory mechanisms</b>.</p> <p>Reduced vegetation cover in the Project Site will continue throughout the life of the Project (be <b>long-term</b>), as nuisance or hazard vegetation will need to be removed to protect the health and safety of AES personnel. At Project end-of-life the lands within the Project Site will be re-contoured and returned to an equivalent state. As vegetation will have been removed for a period of at least 25 years, the effect is considered <b>long-term</b> and is <b>reversible</b>.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 9: Aquatic Environment – Surface Water

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Grading and drainage</li> <li>• Wetland/ creek crossings</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Potential for changes to local hydrological regime due to altered flows from grading and recontouring of the Project area.</p> <p>The Project Site and pipeline ROW are located in an area with a high water table and an existing Crown claimed wetland is located on the Project Site. Grading and drainage will change the surface contours. Without the implementation of technically and economically practicable mitigation measures, the alteration could change surface and subsurface flows, which would change the distribution of surface and shallow sub-surface groundwater.</p> <p>After construction is complete, no further changes to the hydrological regime are anticipated as no grading activities are planned as part of Project operations. Wetland crossings will only occur as part of Project construction.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will engage a qualified Engineer to develop grading and elevation plans.</li> <li>• AES will update and implement its existing SWMP at SW 34-55-21 W4M and will develop a new SWMP at NW-27 and will ensure these plans:               <ul style="list-style-type: none"> <li>○ Comply with the requirements of EPEA (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b). Comply with existing site approval under the Water Act for utilizing Wetland W3 as a stormwater management facility.</li> <li>○ Comply with the existing EPEA Approval requirements and any associated amendments for the proposed Project</li> <li>○ Are specific to the Project</li> <li>○ Include specific measures that will be undertaken to effectively manage drainage</li> </ul> </li> <li>• AES will develop and implement an ESC Plan that will:               <ul style="list-style-type: none"> <li>○ Be based on soil erodibility, vegetative cover, topography and climate.</li> <li>○ Appropriately divert and direct runoff, including installation of sediment barriers.</li> <li>○ Include construction-specific procedural requirements.</li> <li>○ Comply with the requirements of EPEA (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b) to prevent erosion and sedimentation</li> <li>○ Comply with existing site approval under the Water Act for utilizing W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion.</li> <li>○ Comply with the existing EPEA Approval requirements for erosion and sediment control, including any applicable amendments as a result of the proposed Project.</li> <li>○ Comply with Strathcona County requirements for an ESC Report for construction activity.</li> </ul> </li> <li>• AES will ensure ESC measures remain in place until the construction activities are completed and the disturbed area has been stabilized, restored, and where required, revegetated. This includes re-establishing vegetation around the brine pond berms and wetland W3.</li> </ul>	<p><b>Residual Effect – Minor</b></p> <p>During construction, vegetation will be removed from the site and the site will be graded to control runoff. This will result in an increase in impermeable surfaces. Infiltration will be reduced at the Project Site due to the removal of vegetation and increase in impermeable surfaces.</p> <p>Hydrological flows will be altered in accordance with approved grading and drainage plans. The Project may result in minor increases in surface and shallow groundwater flows throughout construction of the Project, which will result in a difference between current flow and predicted flow throughout the operations phase of the Project; however, the effect will be managed through effective design of grading and stormwater management facilities. The potential change is assumed to be neutral, as although flows will change, the change in flows will be minor and are not expected to alter vegetation and wetland availability, fish or fish habitat, or wildlife.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 9: Aquatic Environment – Surface Water

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
			<ul style="list-style-type: none"> <li>Known site-specific features (e.g., wetland, water body) and associated setbacks will be clearly marked on Environmental Alignment Sheets and access and construction environmental maps and flagged prior to the start of clearing activities.</li> <li>Construction cleanup and revegetation will be completed under non-frozen conditions where practicable.</li> <li>AES will comply with the requirements of the Alberta Environment and Parks <i>Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body</i> (GoA 2013), made under the <i>Alberta Water Act</i> (GoA 2017) and <i>Water (Ministerial) Regulation</i> (GoA 2020b), which establishes the requirements and conditions to be met when constructing a pipeline which crosses a waterbody to eliminate or minimize any potential for harmful effects of watercourse crossings activity.</li> <li>AES will comply with all soil handling and management requirements of the existing and amended EPEA Approval, including locations and mechanisms for which soils must be managed.</li> </ul>	<p>This effect is <b>limited to the Project Site</b> and will be <b>managed through existing regulatory mechanisms</b>. Baseline hydrological flows may be diverted throughout the lifetime of the Project, resulting in a <b>long-term</b> change to flows; however, the change to flows will only occur once during construction as part of grading activities, making it an <b>infrequent</b> activity. The effect is <b>reversible</b>. The lands will be recontoured and returned to equivalent capability at the end of Project life.</p>
	<p><u>Construction Phase:</u> Cavern mining</p> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>N/A</li> </ul>	<p>Potential change to flow rates or volumes in the North Saskatchewan River due to water withdrawal for cavern mining.</p> <p>Water used for cavern mining will be obtained through AES's existing and approved ATCO Heartland River Water System (AHRWS) using AES's existing Water Act Diversion Licenses.</p> <p>Withdrawals during the operations phase will be periodic and minimal and are will not have a measurable residual effect.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Water to be used for cavern mining will be diverted as per AES's existing and approved Water Act Licenses.</li> <li>If water diversion is required during a period of withdrawal restrictions, AES will abide by the conditions of the approved and existing Water Act Licenses. Water diversion will align with the Alberta water priority system.</li> <li>Water for cavern mining will be diverted through the existing and approved AES water intake</li> <li>AES will submit an annual water use report to Alberta Environment and Parks to confirm periods and rates of diversion, total monthly volumes, and total annual volumes of water diverted. The annual report will confirm that the AES is withdrawing within the approved limits of AES's existing Water Act Licenses.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>Water for cavern mining will be managed by <b>existing regulatory mechanisms</b>. Water for cavern mining will be diverted in accordance with existing and approved Water Act Licenses. Withdrawals will be within the existing approval rates and volumes. Water diverted for the purposes of cavern mining will only be used on the <b>Project Site</b>.</p> <p>Water withdrawals will occur primarily during the Construction Phase. The effect is expected to be <b>continuous</b> for the mining period, <b>short-term</b>, and <b>reversible</b> as the water withdrawal amounts will not lower the streamflow of the North Saskatchewan River.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 9: Aquatic Environment – Surface Water

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<b>Surface water quality</b>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Grading and drainage</li> <li>• Heavy equipment and earthworks</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• Stormwater management</li> </ul>	<p>Potential for changes to land cover to result in concentrations of suspended solids and chemical constituents at receiving water bodies.</p> <p>The Project Site is located in an area with an existing Crown claimed wetland on the Project Site. The pipeline ROW will also traverse a number of wetlands and water bodies that will be crossed during construction. Vegetation will be cleared, and the Project Site graded as part of construction activities. If AES proceeds with a brine storage pond, the area will be excavated and dewatered prior to shaping the berm walls and placement of the pond liner. Without the application of technically and economically practicable mitigation measures, the exposure of bare earth and soil disturbance could result in an increase in suspended solids and chemical constituents in Wetland W3 and the wetlands and water bodies traversed by the pipeline ROW due to surface water wash off.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• The grading and drainage on the Project Site and surrounding the facilities will be designed to manage water flow to minimize the risk of erosion and siltation of the wetland.</li> <li>• AES will develop and implement an ESC Plan that will:               <ul style="list-style-type: none"> <li>○ Be based on soil erodibility, vegetative cover, topography and climate.</li> <li>○ Appropriately divert and direct runoff, including installation of sediment barriers.</li> <li>○ Include construction-specific procedural requirements.</li> <li>○ Comply with the requirements of <i>EPEA</i> (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b) to prevent erosion and sedimentation</li> </ul> </li> <li>• Comply with existing site approval under the <i>Water Act</i> for utilizing Wetland W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion</li> <li>• Comply with the existing <i>EPEA</i> Approval requirements for erosion and sediment control, including any applicable amendments as a result of the proposed Project.</li> <li>• Comply with Strathcona County requirements for an ESC Report for construction activity.</li> <li>• AES will update and implement its existing SWMP at SW 34-55-21 W4M and will develop a new SWMP at NW-27-55-21 W4M and will ensure these plans:               <ul style="list-style-type: none"> <li>○ Comply with the requirements of <i>EPEA</i> (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b)</li> <li>○ Comply with existing site approval under the <i>Water Act</i> (GoA 2017) for utilizing Wetland W3 as a stormwater management facility.</li> <li>○ Comply with the existing <i>EPEA</i> Approval requirements and any associated amendments for the proposed Project.</li> <li>○ Are specific to the Project.</li> <li>○ Include specific measures that will be undertaken to effectively manage drainage.</li> </ul> </li> <li>• AES will update and implement its existing Groundwater and Wetland Monitoring Program (GWMP) in accordance with the requirements of its <i>EPEA</i> Approval (refer to section 4.2.15 of the Approval).</li> <li>• For pipeline construction, AES will also comply with the requirements of the Alberta Environment and Parks <i>Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body</i> (GoA 2013), made under the Alberta <i>Water Act</i> and <i>Water (Ministerial) Regulation</i>, which establishes the requirements and conditions to be met</li> </ul>	<p><b>Residual Effect – Minor</b></p> <p>Contaminants are not expected to exceed allowable concentrations due to mitigation measures provided. If the effect were to occur, it would be minor and <b>limited to the Project Site</b>. Mitigative measures are also required and prescribed by <b>existing regulatory mechanisms</b>.</p> <p>The effect is considered <b>infrequent</b> and unlikely to occur and if so, would likely be associated with precipitation and melt events. The potential effect is <b>short-term</b> and is <b>reversible</b> through appropriate application of ESC materials and implementation of the ESC Plan.</p> <p>Any contravention of allowable limits would result in non-compliance action taken by the AER.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 9: Aquatic Environment – Surface Water

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures <i>(including Inspection and Monitoring)</i>	Residual Effect
			<p>when constructing a pipeline which crosses a waterbody to eliminate or minimize any potential for harmful effects of watercourse crossings activity.</p> <ul style="list-style-type: none"> <li>• The pipeline crossing of Astotin Creek will be directionally drilled and will not alter or interact with the bed or banks.</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• The product handling facility and wellsite area will drain to a new stormwater management pond that will contain runoff, which will be tested prior to controlled release to the wetland W3.</li> <li>• AES will update and implement its existing SWMP at SW 34-55-21 W4M and will ensure it:               <ul style="list-style-type: none"> <li>○ Complies with the requirements of <i>EPEA</i> (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b).</li> <li>○ Complies with existing site approval under the <i>Water Act</i> (GoA 2017) for utilizing Wetland W3 as a stormwater management facility.</li> <li>○ Complies with the existing <i>EPEA</i> Approval requirements and any associated amendments for the proposed Project</li> <li>○ Is specific to the Project</li> </ul> </li> <li>• Includes specific measures that will be undertaken to effectively manage drainage</li> <li>• Based on final layout of the proposed Project, if runoff from a component of the Project cannot practicably be directed to Wetland W3 (e.g., due to surface infrastructure siting), AES will design, apply for, and obtain regulatory approval for additional stormwater management facilities. This includes approval from the AER and Strathcona County.</li> <li>• Following construction AES will re-establish vegetation around the brine pond berms and wetland W3 and update and implement its ESC Plan to ensure it:               <ul style="list-style-type: none"> <li>○ Complies with the requirements of <i>EPEA</i> (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b) to prevent erosion and sedimentation.</li> <li>○ Complies with existing site approval under the <i>Water Act</i> (GoA 2017) for utilizing Wetland W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion.</li> <li>○ Complies with the existing <i>EPEA</i> Approval requirements and any associated amendments for the proposed Project for erosion and sediment control.</li> <li>○ Is based on soil erodibility, vegetative cover, topography and climate.</li> </ul> </li> </ul>	

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 9: Aquatic Environment – Surface Water

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures <i>(including Inspection and Monitoring)</i>	Residual Effect
			<ul style="list-style-type: none"> <li>○ Includes specific measures that will be undertaken to prevent sedimentation and erosion over the operating life of the facility.</li> <li>• AES will, as per EPEA Approval amendments, update the existing approved Groundwater Monitoring Program, Wetland W3 Monitoring Program and Industrial Wastewater and Runoff Program and implement any required changes to ensure compliance with approval amendments. This includes additional inspection, monitoring and reporting requirements for the new infrastructure.</li> <li>• Mechanisms to draw down increased volumes above high water mark at onsite Wetland W3 are in place as approved by the AER under existing EPEA and Water Act approvals. Any alterations to these methods will be conducted in accordance with existing regulatory approvals and approvals will be amended if these mechanisms are to be altered.</li> <li>• Water impounded on site will be tested prior to release in accordance with AES' EPEA Approval requirements, as amended for the new infrastructure.</li> <li>• Water that does not meet the criteria of the EPEA Approval conditions will be stored on site and disposed of in a licensed facility.</li> <li>• Water released from on site impoundments will be released onto vegetated areas and a minimum of 30 m from the boundary of a wetland or water body.</li> <li>• AES maintains a comprehensive Pipeline Integrity Program, as required by the Pipeline Act, Pipeline Rules and CSA Z662 to ensure routine inspection and monitoring is completed to maintain integrity of pipelines. Cathodic protection is reviewed on an annual basis to mitigate external corrosion. Internal corrosion is investigated annually for each pipeline.</li> <li>• AES will complete annually, as per its EPEA Approval, Groundwater Monitoring Program Report, Wetland W3 Monitoring Report, Industrial Wastewater and Industrial Runoff Report; and any additional reports as amended; and will complete every 5 years a Soil Monitoring Program Report.</li> <li>• AES will complete required annual and monthly inspections of Wetland W3 and report the observations in the Annual Wastewater and Runoff Report.</li> <li>• AES will complete various pipeline inspections, testing and monitoring as per the Pipeline Act, Pipeline Rules, CSA Z662 and AES' Pipeline Integrity Program, including specific inspections and monitoring for pipelines crossing a water body.</li> </ul>	

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 10: Aquatic Environment – Groundwater

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<p><b>Groundwater quantity</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Grading and drainage</li> <li>• Heavy equipment and earthworks</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• Brine storage</li> </ul>	<p>Temporary lowering of groundwater levels due to excavation for the brine pond could reduce groundwater availability to nearby groundwater features (e.g., wetland recharge).</p> <p>The Project is located in an area with a high water table and an existing Crown claimed wetland on the Project Site. Due to previous experience excavating the brine pond for the existing Strathcona Salt Cavern Storage Facility, AES understands that shallow groundwater will be encountered at depths of less than 8 metres. Excavation activities will require dewatering of the excavated area which could affect shallow groundwater flow and wetland drawdown and recharge in Wetland W3 or other wetlands on the Project Site without the application of technically and economically feasible mitigation measures.</p> <p>During operations, groundwater levels may need to be lowered when brine levels in the pond are low.</p> <p>NOTE: Groundwater (hydrogeology) is assessed as part of the required EPEA and Water Act (Dam Safety) Approvals required for the Project.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will obtain an Alberta <i>Water Act</i> (GoA 2017) approval for dewatering beneath the brine pond prior to start of excavation which will identify the terms and conditions applicable to the activity. AES will comply with the Water Act Approval terms and conditions in order to drain groundwater for the purpose of brine pond drainage control and with EPEA Approval requirements for water management.</li> <li>• Any short-term water takings from surface or groundwater sources for construction purposes will be conducted in accordance with the Water Act (GoA 2017) and the Water (Ministerial) Regulation (GoA 2020b).</li> <li>• Water from dewatering activities will be contained on site, tested, and released at a controlled rate onto vegetated areas at least 30 m from the boundary of wetlands, or as approved by the AER and the EPEA Approval in place.</li> <li>• Water that does not meet the criteria of the EPEA approval conditions for release will be disposed of in a licensed facility.</li> <li>• Any private wells within 100 m of construction activities will be identified on the Environmental Alignment Sheets and Access and environmental construction maps prior to start of construction.</li> <li>• AES will identify artesian conditions before excavating for the brine pond or building foundations and adjust dewatering measures accordingly.</li> <li>• AES will implement measures to:               <ul style="list-style-type: none"> <li>○ Control or stop discharge of water from within the excavated areas.</li> <li>○ Divert groundwater discharging at surface away from the excavated area and prevent backflow into the excavated area.</li> <li>○ Control and contain discharge water from within the excavated areas.</li> </ul> </li> <li>• If artesian conditions are encountered during construction, AES will:               <ul style="list-style-type: none"> <li>○ Maintain an adequate supply of containment to respond to large volumes of water.</li> <li>○ Ensure adequate standby equipment is available (e.g., pumps and tubing).</li> </ul> </li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>There is no residual effect predicted as the groundwater pumped during dewatering activities will be tested and released to wetland W3, where it will re-infiltrate to the groundwater (i.e. <b>reversible</b>).</p> <p>The excavation will be <b>limited to the Project-site</b> and will occur <b>once</b> during Project construction. As a result, it is expected to be <b>short-term</b> and effects to surface water features as a result of excavation and any groundwater displacement are not anticipated.</p> <p>The activity is managed by <b>existing regulatory mechanisms</b>. AES will implement measures in accordance with the terms and conditions of a Water Act (GoA 2017) approval prior to starting excavation. Groundwater collected from dewatering will be diverted and released back to the environment as per a Water Act Approval and following approved ESC Plans.</p> <p>Clearing of vegetation in high permeability areas may result in a short-term increase in groundwater levels and an increase in groundwater availability; however, the effect is considered <b>reversible</b>. As the site revegetates, groundwater levels are expected to return to similar conditions.</p>



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 10: Aquatic Environment – Groundwater

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
			<p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>AES will follow the terms and conditions of the Alberta <i>Water Act</i> (GoA 2017) approval for dewatering beneath the brine pond and with EPEA Approval requirements for water management.</li> <li>AES will update and implement its existing Groundwater Monitoring Program in accordance with the EPEA Approval.</li> </ul>	
<p><b>Groundwater quality</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Vegetation clearing</li> <li>Soil salvage and stockpiling</li> <li>Grading and drainage</li> <li>Heavy equipment and earthworks</li> <li>Wetland/ creek crossings</li> <li>Ground disturbance and excavation</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>N/A</li> </ul>	<p>Earthworks, excavation, and construction at the Project Site could disturb pre-existing contaminated soils, which can contaminate groundwater consumed by animals or transpired by plants.</p> <p>The Project Site has been cultivated and developed for industrial use for a number of years and there is potential that excavation for the Project could unearth contaminated soils, which could then leach into the groundwater without the implementation of technically and economically practicable mitigation measures.</p> <p>Much of the site has been in operation since 2016 and AES has an understanding of activities prior to 2016 that may have resulted in contamination at the site.</p> <p>Areas with exceedances of the Alberta Tier 1 Soil and Groundwater Remediation Guidelines were identified during 2017 soil sampling events and were identified as background concentrations (prior to AES development). The pipeline ROW is situated in an area where several other pipelines are already operating. There is a possibility that contaminated soils</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>If the presence of contaminated soils and/or groundwater is suspected, AES will immediately assess the situation and may shut down or remove equipment from the area.</li> <li>If contamination of soils or fill material is suspected within the Project footprint (e.g. hydrocarbon odour is present, or soil is noticeably different in colour, texture, or saturation than the surrounding soil), work will be immediately halted in that location, and the area or the potentially contaminated material will be isolated.</li> <li>If contaminated soils or fill materials are suspected, a sample will be collected at the suspected contamination location.</li> <li>If contaminated soils or fill materials are confirmed, AES will:             <ul style="list-style-type: none"> <li>Notify relevant regulatory authorities as required.</li> <li>Develop a suitable course of action (e.g., excavate, stockpile, sample, remediate, and/or contain and dispose) in consultation with the appropriate regulatory agencies, if necessary.</li> <li>Identify the closest licensed landfill that would be able to receive contaminated soils.</li> <li>Ensure that contaminated soils are segregated or separately stored on a high-density polyethylene liner or equivalent at a minimum 100 m away from permanent water features and on a flat surface (or relatively flat if no other option is available). Label and/or install signage at entry points to the contaminated soil piles.</li> </ul> </li> <li>Contaminated soil piles will be protected from erosion through the installation of silt fencing or using plastic tarps to cover the pile as necessary.</li> <li>AES will ensure that if imported fill material is required, it will be inspected and will be delivered clean and free of contaminants.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>Contingency soil handling measures in the event contaminated soils are encountered during construction will limit the extent of any potential for adverse effects from contamination. Removal of contaminated soils will prevent downstream contamination.</p> <p>Handling of soil will be done in accordance with <b>existing regulatory mechanisms</b> and as required by EPEA Approval 357248-00-01, as amended. Appropriate remediation and reclamation plans will be developed in accordance with AER requirements.</p> <p>Potential effects are <b>limited to the Project Site</b> and the construction phase (<b>short-term</b>). Ground disturbance activities will end with construction following excavation of the brine pond. The potential effect is considered to be <b>unlikely</b> due to existing administrative and regulatory controls in place and response measures in place and are <b>reversible</b>.</p>

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 10: Aquatic Environment – Groundwater

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
		<p>could be encountered during construction due to spills or leaks from equipment or infrastructure belonging to those operators.</p> <p>No ground disturbance is expected following completion of construction (i.e., during operation of the Project).</p> <p><i>NOTE: Under current terms and conditions of AES' existing Water Act approval for dewatering beneath the existing brine pond, AES is obligated to ensure that no substance that will adversely affect the area associated with the activity or any water body is deposited, and AES is obligated to ensure that no water is released into a waterbody unless the quality of water is equal to or better than the quality of water in the receiving water body. AES will be required to comply with similar obligations for the proposed Project.</i></p> <p><i>Refer also to the DPD (Section 9) for additional information on brine pond leak prevention and detection systems during operations.</i></p>	<ul style="list-style-type: none"> <li>• AES will develop and implement an ESC Plan that will:               <ul style="list-style-type: none"> <li>○ Be based on soil erodibility, vegetative cover, topography and climate</li> <li>○ Appropriately divert and direct runoff, including installation of sediment barriers.</li> <li>○ Include construction-specific procedural requirements</li> <li>○ Comply with the requirements of EPEA (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b) to prevent erosion and sedimentation.</li> <li>○ Comply with existing site approval under the <i>Water Act</i> (GoA 2017) for utilizing Wetland W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion.</li> <li>○ Comply with the existing EPEA Approval requirements for erosion and sediment control, including any applicable amendments as a result of the proposed Project.</li> <li>○ Comply with Strathcona County requirements for an ESC Report for construction activity.</li> </ul> </li> <li>• Water collected from excavation dewatering activities that is impounded on site will be tested prior to release in accordance with AES' EPEA Approval requirements, as amended for the new infrastructure. Water that does not meet the criteria of the EPEA Approval conditions will be stored on site and disposed of in a licensed facility.</li> </ul> <p>During the operations phase, inspection and monitoring activities are undertaken as per requirements of AES' EPEA Approval (as amended) including implementation of the Groundwater Monitoring Program and the Soil Monitoring Program. Refer to Section 4.5.1 of EPEA Approval 357248-00-01, as amended. Additional mitigation measures would be implemented for this indicator if contaminated soils were encountered during excavation of the brine pond.</p>	<p>If contaminated soils or groundwater are encountered during construction, or contaminated groundwater is encountered during operations, (refer to Soils Table 12), the water will not be released to Wetland W3. The water will be tested and may be repurposed for cavern mining or securely stored and disposed of at a licensed facility. Exposure of soils is predicted to be short-term in duration and can be managed through existing groundwater and soil handling procedures and regulatory mechanisms.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 11: Aquatic Environment – Fish and Fish Habitat, Aquatic Species

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<b>Habitat availability</b>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Grading and drainage</li> <li>• Heavy equipment and earthworks</li> <li>• Wetland/creek crossings</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Potential for alteration to habitat availability from change to hydrology or groundwater flow or from increases or decreases in sedimentation in receiving water bodies.</p> <p>No fish-bearing water bodies are present on AES' Project Site. Fish inventories of Astotin Creek have revealed the presence of forage fish; however, it has been noted that in recent years Astotin Creek has run dry in the late summer season and beaver damming may have altered the ability of Astotin Creek to bear fish (Chen 2009). For the purposes of this assessment, Astotin Creek is assumed to continue to bear fish. Interaction with Astotin Creek is limited to the pipeline ROW crossing which will be directionally drilled to avoid potential adverse effects to the bed and banks of Astotin Creek. No fish-bearing water bodies will be disturbed during Project operations.</p> <p>Fish and Fish Habitat as defined in subsection 2(1) of the <i>Fisheries Act</i>, and Aquatic Species as defined in subsection 2(1) of the <i>Species at Risk Act</i> are stated in the <i>Impact Assessment Act</i> to be within the legislative authority of Parliament.</p> <p>As a result, the technically and economically practicable mitigation measures for Fish and Fish Habitat and Aquatic Species are presented in this screening.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• The pipeline crossing of Astotin Creek will be directionally drilled and will not alter the bed or banks.</li> <li>• For pipeline construction, AES will comply with the requirements of the Alberta Environment and Parks Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body (GoA 2013), made under the Alberta Water Act and Water (Ministerial) Regulation, which establishes the requirements and conditions to be met when constructing a pipeline which crosses a waterbody to eliminate or minimize any potential for harmful effects of watercourse crossings activity.</li> <li>• AES will ensure the development of a site-specific frac-out contingency plan</li> <li>• AES will engage a qualified Engineer to develop grading and elevation plans.</li> <li>• AES will develop and implement an ESC Plan that will:               <ul style="list-style-type: none"> <li>○ Be based on soil erodibility, vegetative cover, topography and climate</li> <li>○ Appropriately divert and direct runoff, including installation of sediment barriers.</li> <li>○ Include construction-specific procedural requirements</li> <li>○ Comply with the requirements of <i>EPEA</i> (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b) to prevent erosion and sedimentation.</li> <li>○ Comply with existing site approval under the <i>Water Act</i> (GoA 2017) for utilizing Wetland W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion.</li> <li>○ Comply with the existing <i>EPEA</i> Approval requirements for erosion and sediment control, including any applicable amendments as a result of the proposed Project.</li> <li>○ Comply with Strathcona County requirements for an ESC Report for construction activity.</li> </ul> </li> </ul>	<p><b>No Measurable Residual Effect (No effect)</b></p> <p>No effect is predicted and no effects to surface water quality or quantity are predicted to result in adverse effects to Fish and Fish Habitat or Aquatic Species.</p> <p><b>As such, geographic extent, reversibility, duration, frequency and existing regulatory mechanisms are not applicable.</b></p> <p>None of the wetlands or water bodies on AES' Project Site are presently known to be fish bearing. The pipeline ROW traverses Astotin Creek, which is a Class C waterbody and is conservatively assumed to be fish-bearing. The pipeline ROW crossing of Astotin Creek will be directionally drilled to eliminate potential effects to the bed and banks of Astotin Creek.</p> <p>Alterations to the grade and drainage patterns at the Project Site are not expected to alter fish habitat or affect fish and there is no reasonably foreseeable method for onsite sedimentation processes affecting off-site fish and fish habitat. There will be no increase of sedimentation in fish-bearing water bodies as a result of Project activities.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 4.3 Terrestrial Environment

Table 12: Terrestrial Environment - Geology

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
Subsurface communication	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Drilling</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>N/A</li> </ul>	<p>Drilling and casing of cavern storage and disposal wells could result in communication with groundwater or other hydrocarbon zones/formations.</p> <p>The salt caverns will be developed at a depth of 1,800 m below surface. This will be achieved through drilling and casing of a well, terminating in the Lotsberg formation.</p> <p>Brine generated by washing activities is disposed of downhole into disposal wells completed in the Nisku formation approximately 1,000 m below the surface.</p> <p>No wells are planned to be drilled as part of Project operations.</p> <p>The mitigation measures presented in this section are technically and economically practicable, align with best practices for cavern development and storage, and present the regulatory setting for cavern operations in Alberta.</p> <p><i>NOTE: This indicator was included as a result of stakeholder concerns. There is no pathway for subsurface communication following drilling and casing of cavern wells. The Nisku Formation is currently utilized for brine disposal. Refer to Sections 9 and 12 of the DPD for details on these formations, including how salt is impermeable to hydrocarbon products.</i></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>The disposal well surface casing will be set at least 25 metres below the lowest depth of groundwater protection and an additional production casing will be set into the top of the Nisku formation. The disposal well will be cemented in place. These casings prevent migration of disposal fluids into other formations or into the water table.</li> <li>The Nisku formation is currently utilized for brine disposal.</li> <li>Cavern wells will be similarly cased, with both a surface and production casing and will be set into the Lotsberg Formation. The Lotsberg Formation is currently utilized for cavern storage.</li> <li>AES will obtain well licenses from the AER and retain a qualified engineering firm to complete drilling of the wells.</li> <li>AES will obtain approval under Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging, and Testing Requirements (AER 1994) for the brine disposal well.</li> <li>Wells will be drilled in accordance with Directive 036: Drilling Blowout Prevention Requirements and Procedures (AER 2019).</li> </ul> <p>During the operations phase, inspection and monitoring activities are undertaken including casing integrity inspections to ensure casing integrity is maintained.</p>	<p><b>No Measurable Residual Effect</b></p> <p>No effects on subsurface communication are expected. Drilling activity will be <b>short-term</b> and occur <b>once</b> and be <b>limited to the Project Site</b>.</p> <p>Cavern storage and downhole injection have <b>existing regulatory mechanisms</b>.</p> <p>Cavern and disposal well construction, operation and decommissioning are discussed in Section 9 of the DPD.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 12: Terrestrial Environment - Geology

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Brine disposal</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• Brine disposal</li> </ul>	<p>Brine injected into the Nisku formation could migrate to other formations.</p> <p>The Nisku formation is a regionally extensive formation that is appropriate for disposal due to its high porosity and permeability without the presence of naturally occurring hydrocarbons. Injection into the Nisku formation is common in oil and gas operations in Alberta.</p> <p>Brine generated during cavern washing operations is injected into the Nisku formation approximately 1,000m below the surface.</p> <p>During the Operations phase, brine will be infrequently injected into the Nisku formation as operational needs dictate.</p>	<p><u>Construction and Operations Phases:</u></p> <ul style="list-style-type: none"> <li>• Migration of brine to zones above and below the Nisku formation is prevented by the natural sealing nature of the rock layers above and below the Nisku disposal zones.</li> <li>• The disposal well will be completed with the production casing drilled and cemented into the Nisku formation, isolating the wellbore from the zones above the Nisku</li> <li>• AES will operate its disposal wells at pressures that are much lower than the maximum allowable pressure permitted by the AER in its existing disposal scheme (Approval #7900C)</li> <li>• Disposal volumes will be reported to AER on an annual basis in accordance with the requirements of Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging, and Testing Requirements (AER 1994).</li> <li>• AES will continue to be a member of the Western Canada Cavern Operators Group and will submit annual pressure and temperature gradient information as required.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>No effects to subsurface communication are expected. Brine injection during construction activity will be <b>short-term</b> and <b>continuous</b>.</p> <p>Brine injection during cavern operations will be <b>infrequent</b> over the life of the Project, low in volume and <b>irreversible</b>. However, the Nisku Formation is currently utilized for brine disposal and the depth of disposal ensures no interaction with any VCs.</p> <p>Brine disposal wells will be cased below the depth of groundwater protection to prevent any communication with groundwater.</p> <p>Cavern storage and downhole injection have <b>existing regulatory mechanisms</b>.</p> <p>Cavern and disposal well construction, operation and decommissioning are discussed in Section 9 of the DPD.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 13: Terrestrial Environment – Terrain and Soils

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
Soil quality	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Grading and drainage</li> <li>• Soil stockpiling</li> <li>• Heavy equipment and earthworks</li> <li>• Wetland/creek crossings</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Construction activities could reduce soil quality through admixing of stockpiled soils or compaction and rutting of topsoils, potentially resulting in a reduction of soil productivity.</p> <p>Soils will be stripped and stockpiled during construction of the Project and stored on site for the life of the facility. Soils may also be affected through the use of construction equipment and could cause increased erosion fragility when soil handling occurs in wet or frozen conditions without the application of technical and economically feasible mitigation measures.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will comply with the soil handling terms and conditions in EPEA Approval 357248-00-01, as amended. These terms and conditions include: <ul style="list-style-type: none"> <li>○ Stripping of topsoil and subsoil will be suspended when wet or frozen conditions would result in mixing, loss or degradation of topsoil or upper subsoil.</li> <li>○ All topsoil and upper subsoil will be salvaged, stockpiled separately and on stable foundations, revegetated or otherwise stabilized to prevent erosion, and conserved for land reclamation.</li> <li>○ All topsoil will be stockpiled on undisturbed topsoil and all upper subsoil will be stockpiled on areas where the topsoil has been removed.</li> <li>○ Topsoil and subsoil disturbed during grading will not be mixed with foreign material (e.g., brush or stumps).</li> </ul> </li> <li>• AES will develop and implement an ESC Plan that will: <ul style="list-style-type: none"> <li>○ Be based on soil erodibility, vegetative cover, topography and climate</li> <li>○ Appropriately divert and direct runoff, including installation of sediment barriers.</li> <li>○ Include construction-specific procedural requirements</li> <li>○ Comply with the requirements of EPEA (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b) to prevent erosion and sedimentation</li> <li>○ Comply with existing site approval under the Water Act (GoA 2017) for utilizing Wetland W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion.</li> <li>○ Comply with the existing EPEA Approval requirements for erosion and sediment control, including any applicable amendments as a result of the proposed Project</li> <li>○ Comply with Strathcona County requirements for an ESC Report for construction activity.</li> </ul> </li> <li>• Soils for pipeline construction will be stockpiled or windrowed on the approved Project footprint and will be restored following completion of construction.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>Soil will be salvaged, stockpiled, conserved and monitored under <b>existing regulatory mechanisms</b> in accordance with AES' existing EPEA Approval 357248-00-01, as amended. Soil will be stockpiled and revegetated as required to maintain stability and reduce potential erosion. Soil that is rutted or compacted during construction will be recontoured as part of construction clean-up.</p> <p>Soil stockpiles will remain on site until end of Project life in accordance with regulatory approvals. Admixing will be reduced through application of soil conservation practices in accordance with existing regulatory approvals.</p> <p>The potential effect is <b>limited to the Project Site</b>. While the duration of construction activities having the potential to cause an effect on soil quality is <u>short term</u> and <u>intermittent</u>, the duration of stockpile storage is <u>long-term</u> as soil stockpiles will remain on site for the duration of the Project operations. However, the effect is <b>reversible</b>, and the site is expected to return to equivalent capability after decommissioning and reclamation. Potential effects to soil quality will be reduced through <b>infrequent</b> handling of soil.</p>

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 13: Terrestrial Environment – Terrain and Soils

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
			<ul style="list-style-type: none"> <li>• AES will develop a Soil Handling Contingency Plan during topsoil stripping if any of the following are encountered: little or no topsoil; uneven boundary between topsoils and subsoils; poor colour separation between topsoils and subsoils; stony soils; wet conditions; high winds.</li> <li>• If compaction or rutting is observed, use of swamp mats or corduroy will be evaluated.</li> <li>• Where practicable, soils will not be stripped in wetlands.</li> <li>• Construction cleanup and revegetation will be completed under non-frozen conditions where practicable.</li> </ul> <p>AES' Soil Monitoring Program as approved under EPEA Approval 357248-00-01, as amended for the existing Project Site will be updated and implemented for operations.</p>	

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 14: Terrestrial Environment - Vegetation & Wetlands

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<p><b>Ecosystem availability and distribution</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Grading and drainage</li> <li>• Heavy equipment and earthworks</li> <li>• Wetland/creek crossings</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• Stormwater management</li> </ul>	<p>Planned removal of vegetation and construction activities on de-vegetated areas could affect the hydrologic flows in the area which could cause soil erosion and moisture changes, which could then affect ecosystem availability and distribution</p> <p>The Project Site has an existing Crown claimed wetland and the pipeline ROW will traverse several wetlands and small water bodies. Construction activities will involve earthworks and excavation which also may allow shallow groundwater to pool in excavated areas. This could result in soil erosion due to surface flow or loss of soil moisture due to diversion of shallow groundwater flows to excavated areas without the implementation of technically and economically practicable mitigation measures.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will comply with the soil handling terms and conditions in EPEA Approval 357248-00-01, as amended. These terms and conditions include:               <ul style="list-style-type: none"> <li>○ Stripping of topsoil and subsoil will be suspended when wet or frozen conditions would result in mixing, loss or degradation of topsoil or upper subsoil.</li> <li>○ All topsoil and upper subsoil will be salvaged, stockpiled separately and on stable foundations, revegetated or otherwise stabilized to prevent erosion, and conserved for land reclamation.</li> <li>○ All topsoil will be stockpiled on undisturbed topsoil and all upper subsoil will be stockpiled on areas where the topsoil has been removed.</li> <li>○ Topsoil and subsoil disturbed during grading will not be mixed with foreign material (e.g., brush or stumps).</li> </ul> </li> <li>• AES will develop and implement an ESC Plan that will:               <ul style="list-style-type: none"> <li>○ Be based on soil erodibility, vegetative cover, topography and climate</li> <li>○ Appropriately divert and direct runoff, including installation of sediment barriers.</li> <li>○ Include construction-specific procedural requirements</li> <li>○ Comply with the requirements of EPEA (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b) to prevent erosion and sedimentation</li> <li>○ Comply with existing site approval under the Water Act (GoA 2017) for utilizing Wetland W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion</li> <li>○ Comply with the existing EPEA Approval requirements for erosion and sediment control, including any applicable amendments as a result of the proposed Project</li> <li>○ Comply with Strathcona County requirements for an ESC Report for construction activity.</li> </ul> </li> <li>• Grading on slopes prone to erosion or steep slopes on the pipeline ROW will be avoided.</li> </ul>	<p><b>Residual Effect – Minor</b></p> <p>Changes to existing drainage due to grading and recontouring of the Project area including construction and operation of stormwater management facilities will result in altered drainage patterns.</p> <p>The effect is expected to be <b>infrequent</b> and <b>limited to the Project Site</b> and may result in increased surface and shallow groundwater flows in the area surrounding the activity, which could change ecosystem composition. However, the effect if realized would be <b>short-term</b> and <b>reversible</b> through the implementation of response measures. The effect will also be managed through <b>existing regulatory mechanisms</b> including approval terms and conditions. Changes to the site contouring will occur during the Construction Phase; however, the change is predicted to be managed through the implementation of effective soil handling and ESC plans.</p>



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 14: Terrestrial Environment - Vegetation & Wetlands

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
			<ul style="list-style-type: none"> <li>• AES will develop a Soil Handling Contingency Plan during topsoil stripping if any of the following are encountered: little or no topsoil; uneven boundary between topsoils and subsoils; poor colour separation between topsoils and subsoils; stony soils; wet conditions; high winds.</li> <li>• If compaction or rutting is observed, use of swamp mats or corduroy will be evaluated.</li> <li>• Where practicable, soils will not be stripped in wetlands.</li> <li>• Construction cleanup and revegetation will be completed under non-frozen conditions where practicable.</li> <li>• If a wetland crossing associated with the pipeline ROW must be trenched, AES will retain the services of a Qualified Aquatic Environmental specialist (QAES) to prepare a wetland assessment impact form (WAIF) and submit a notification to the AER under the Code of Practice for Pipelines and Telecommunications Lines Crossing a Water Body (GoA 2013).</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will update and implement its existing SWMP at SW 34-55-21 W4M and will develop a new SWMP at NW 27-55-21 W4M, if required, and will ensure these:               <ul style="list-style-type: none"> <li>○ Comply with the requirements of EPEA (GoA 2020a) and regulations, the <i>Water Act</i> (GoA 2017), and the <i>Water (Ministerial) Regulation</i> (GoA 2020b).</li> <li>○ Comply with existing site approval under the Water Act for utilizing wetland W3 as a stormwater management facility.</li> <li>○ Comply with the existing EPEA Approval requirements and any associated amendments for the proposed Project</li> <li>○ Are specific to the Project</li> <li>○ Include specific measures that will be undertaken to effectively manage drainage</li> </ul> </li> <li>• AES will update and implement its existing GWMP in accordance with the requirements of its EPEA Approval (refer to section 4.5.1 of the Approval) and will ensure this:               <ul style="list-style-type: none"> <li>○ Characterizes the groundwater in the Project Site.</li> <li>○ Identifies monitoring well locations and rationale for their selection.</li> </ul> </li> </ul>	<p>It is predicted that some minor changes may occur to existing vegetation ecosystems that will be adjacent to areas where soil will be salvaged, or vegetation will be cleared. It is predicted that the effect will be short-term, occur in relation to clearing activities, and that the vegetation communities will return to a similar state as prior to disturbance after construction clean-up is completed (<b>reversible</b>).</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 14: Terrestrial Environment - Vegetation & Wetlands

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
			<ul style="list-style-type: none"> <li>○ Identifies parameters to be monitored/sampled and their monitoring frequency.</li> <li>○ Describes the groundwater sampling and analytical QA/QC procedures.</li> <li>● Water impounded on site will be tested prior to release in accordance with the AES' EPEA Approval conditions.</li> <li>● Water that does not meet the criteria of the AES' EPEA Approval conditions will be stored on site and disposed of in a licensed facility.</li> <li>● Water released from on site impoundments will be released onto vegetated areas and never directly into a wetland or water body.</li> </ul> <p>AES will complete annually, as per its EPEA Approval, Groundwater Monitoring Program Report, Wetland W3 Monitoring Report, Industrial Wastewater and Industrial Runoff Report; and any additional reports as amended; and will complete every 5 years a Soil Monitoring Program Report. AES will complete required annual and monthly inspections of Wetland W3 and report the observations in the Annual Wastewater and Runoff Report.</p>	
	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>● Grading and drainage</li> <li>● Heavy equipment and earthworks</li> <li>● Wetland/creek crossings</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>● Vegetation management</li> </ul>	<p>Introduction of noxious and invasive plants from construction equipment can negatively affect ecosystem availability and distribution</p> <p>The Project is located in an area where portions of the surrounding area are cultivated for agricultural purposes. Crops grown in the area can be susceptible to clubroot infestation and management of clubroot is required for projects being completed in Strathcona County. Vegetation clearing and Project construction can inadvertently spread weeds between sites or along a construction ROW due to noxious weed species material and seeds attaching to equipment or clothing.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>● AES will implement weed-specific mitigation measures as described in the Alberta Weed Control Act to reduce spreading of noxious weeds.</li> <li>● AES will develop and implement a Clubroot Management Program in accordance with the Development Permit requirements of Strathcona County.</li> <li>● Construction equipment, including supplementary materials such as rig mats, will arrive on the Project Site clean (i.e., free of soil and vegetation debris).</li> <li>● Any equipment that arrives on the construction site in a dirty condition (i.e., visible soil or vegetation debris) will not be allowed on the Project Site until the equipment has been cleaned either by hand, high pressure water, or compressed air.</li> <li>● Vehicles and equipment will be re-cleaned if an area of clubroot infestation is encountered on the Project footprint (i.e., the pipeline ROW) prior to accessing areas of the site without clubroot.</li> <li>● If reseeding is required, certified seed mix will be utilized as described in the ESC Plan</li> <li>● Weed control measures on the pipeline ROW may be subject to agreements with landowners or other third parties. If this in the case, AES will work with the landowners to ensure adequate vegetation management activities during construction.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>The effect is expected to be avoided based on mitigation measures and <b>limited to the Project Site</b> if it occurred. The Project Site will be patrolled regularly throughout construction. Instances of weed infestation will be noted and addressed. AES will require Project personnel to abide by requirements to keep equipment and personal effects clean and free of vegetative debris.</p>

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 14: Terrestrial Environment - Vegetation & Wetlands

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
			<p><i>Inspection and monitoring throughout construction will take place as per the Clubroot Management Program, and as required by Strathcona County</i></p> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will update and implement the existing Vegetation Management Plan which will:               <ul style="list-style-type: none"> <li>○ Define AES's Integrated Vegetation Management Approach.</li> <li>○ Incorporate the use of physical, chemical, cultural, and biological treatments for reducing pest plant populations (weed control) and unwanted vegetation (operational brushing) to regulated levels.</li> <li>○ Include specific inspection and monitoring activities</li> <li>○ Be implemented in coordination with the guidance from the Professional Vegetation Management Association of Alberta Industry Standards and Good Practices for Vegetation Management (2008) and all other industry Best Practices.</li> </ul> </li> <li>• Use of pesticides will comply with the Pesticide (Ministerial) Regulation (GoA 2018) and the Environmental Code of Practice for Pesticides (GoA 2010).</li> <li>• Use of pesticides will be prohibited within 30 m of wetlands and water bodies associated with the Project Site unless unavoidable. In the event that a pesticide must be used within the area, AES will ensure that the Contractor thoroughly understands and will comply with Section 16 of the <i>Environmental Code of Practice for Pesticides</i> (AEP 2010).</li> <li>• Weed control measures on the pipeline ROW may be subject to agreements with landowners or other third parties. If this is the case, AES will work with the landowners to ensure vegetation management activities meet the objectives of AES' Vegetation Management Program and the landowner's requirements.</li> </ul>	<p>Strathcona County has specific mitigation measures that must be implemented at construction sites in the AIH that may be prone or sensitive to clubroot infestation. Additional requirements are also anticipated as part of EPEA Approval 357248-00-01, as amended. These <b>existing regulatory mechanisms</b> are expected to effectively mitigate most weed infestations through avoidance.</p> <p>Weed infestations are anticipated to be unlikely or <b>infrequent</b>. If weed infestations are encountered, they will be immediately addressed through AES's Clubroot Management Plan during construction or Vegetation Management Plan during operation. The infestation would be <b>short-term</b> and would be <b>reversible</b> through the implementation of vegetation management measures.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 15: Terrestrial Environment – Wildlife and Migratory Birds

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<b>Habitat availability</b>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Grading and drainage</li> <li>• Heavy equipment and earthworks</li> <li>• Wetland/creek crossings</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Loss or alteration of vegetation and topography can reduce or degrade wildlife habitat</p> <p>The Project Site has an existing industrial facility. It also has an existing Crown claimed wetland and the pipeline ROW will traverse several wetlands and small water bodies. Wetlands and water bodies provide habitat for terrestrial wildlife and migratory birds.</p> <p>Construction clearing, grading, and excavation can redirect surface water and shallow groundwater, resulting in changes to vegetation communities near Project infrastructure. Alteration of slopes and topography can also alter vegetation communities. Vegetation will also be removed along the pipeline ROW. The removal or alteration of these vegetation communities has the potential to affect existing wildlife and migratory bird use of habitat.</p> <p>Vegetation clearing will not occur as part of Project operations. If vegetation removal is required, it will be limited to removal of weeds or site-specific removal of hazardous or nuisance vegetation.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will engage a qualified Engineer to develop grading and elevation plans.</li> <li>• AES will obtain a Development Permit Approval from Strathcona County for the facility site prior to commencing construction and will abide by the Approval terms and conditions regarding grading.</li> <li>• If any construction work is required in Key Wildlife and Biodiversity Zone #454 during the restricted activity period, AES will retain a Resource Specialist to prepare a Key Wildlife and Biodiversity Zone Protection Plan and submit it to Alberta Environment and Parks for review and written approval by the Director.</li> <li>• Known site-specific features (e.g., wetland, water body) and associated setbacks will be clearly marked on the Environmental Alignment Sheets and access and construction environmental maps to prevent accidental disturbance of these features.</li> <li>• All required wildlife surveys will be completed prior to start of construction and AES will develop a Discovery of Suspected Wildlife Habitat or Features of Concern Contingency Plan</li> <li>• If a wildlife feature of concern (e.g. sharp tailed grouse lek, hibernacula) is encountered, AES will implement the Discovery of Suspected Wildlife Habitat or Features of Concern Contingency Plan.</li> <li>• If reseeding is required, it will be completed in accordance with the reseeding measures in the Erosion and Sediment Control (ESC) Plan</li> <li>• The Project footprint will be surveyed prior to start of construction and a wildlife sweep will be conducted.</li> <li>• AES will adhere to the recommended construction timing windows and restrictions where practicable.</li> <li>• Vegetation clearing and construction of the pipeline will comply with the requirements for Class II pipelines as presented in the Guide for Pipeline Pursuant to the Environmental Protection and Enhancement Act and Regulations (AER 1994).</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>The potential effect will be <b>limited to the Project Site</b> and is expected to be unlikely or <b>infrequent</b>. The Project Site is made up of currently cultivated or developed lands and is at the site of the existing AES Strathcona Salt Cavern Storage Facility. The pipeline ROW parallels a number of existing pipelines and the habitat in the pipeline ROW area has been affected by construction of other pipelines. The pipeline ROW will be revegetated with compatible vegetation following construction. It is expected that habitat along the pipeline ROW would not be of high quality due to ongoing disturbance and previous revegetation.</p> <p>Lands to be disturbed have limited habitat value and it is predicted that most wildlife, including migratory birds, will favour the 30 m vegetated buffer surrounding wetland W3 which will be maintained in accordance with recommended provincial setbacks (AEP 2012), Strathcona County bylaws and existing, amended, or new EPEA and Water Act Approvals.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 15: Terrestrial Environment – Wildlife and Migratory Birds

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
			<ul style="list-style-type: none"> <li>• Vegetation clearing and grading of the facility site will comply with the conditions of EPEA Approval 357248-00-01, as amended.</li> <li>• AES will develop and implement an ESC Plan that will:               <ul style="list-style-type: none"> <li>○ Be based on soil erodibility, vegetative cover, topography and climate</li> <li>○ Appropriately divert and direct runoff, including installation of sediment barriers.</li> <li>○ Include construction-specific procedural requirements</li> <li>○ Comply with the requirements of EPEA (GoA 2020a) and regulations, the Water Act (GoA 2017), and the Water (Ministerial) Regulation (GoA 2020b) to prevent erosion and sedimentation</li> <li>○ Comply with existing site approval under the Water Act (GoA 2017) for utilizing wetland W3 as a stormwater management facility, which requires an ESC Plan to protect the wetland from siltation and erosion</li> <li>○ Comply with the existing EPEA Approval requirements for erosion and sediment control, including any applicable amendments as a result of the proposed Project</li> <li>○ Comply with Strathcona County requirements for an ESC Report for construction activity.</li> </ul> </li> <li>• If a wetland crossing associated with the pipeline ROW must be trenched, AES will retain the services of a QAES to prepare a WAIF and submit a notification to AER under the Code of Practice for Pipelines and Telecommunications Lines Crossing a Water Body (GoA 2013).</li> </ul>	<p>Outside of the Project Site, migratory birds are also expected to favour the wetland complex surrounding Astotin Creek. Construction of the pipeline ROW may temporarily disrupt use of these wetlands; however, the disturbance will be <b>short term</b> and will be <b>reversible</b> following post-construction clean up and revegetation of the ROW. Crossings of wetlands will be done in accordance with <b>existing regulatory mechanisms</b> to minimize or eliminate potential effects.</p> <p>Alberta has existing environmental and technical regulatory guidance for the construction and operation of pipelines. The disturbance along the pipeline ROW will be short-term in nature and while there may be an initial and <b>short-term</b> change to the makeup of vegetative cover, the effects are <b>reversible</b>.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 15: Terrestrial Environment – Wildlife and Migratory Birds

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Soil salvage and stockpiling</li> <li>• Grading and drainage</li> <li>• Heavy equipment and earthworks</li> <li>• Wetland/creek crossings</li> <li>• Ground disturbance and excavation</li> <li>• Drilling</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• Equipment operation</li> <li>• Operational rounds and maintenance</li> </ul>	<p>Sensory disturbance can reduce or degrade wildlife habitat</p> <p>Construction of surface facilities will occur within the Project Site, adjacent to AES’s existing Strathcona Salt Cavern Storage Facility. Construction will increase traffic to and on the site and increase the number of personnel on site. Construction will also occur along the pipeline ROW, which traverses a number of wetlands and small water bodies. This increase in human activity could have a negative sensory effect on wildlife and migratory bird use of these habitats without the implementation of technically and economically feasible mitigation measures.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Site preparation, drilling, and general construction activities on the Project Site will comply with Section 3.1.1 of AER Directive 038: Noise Control (AER 2007).</li> <li>• The Project Site has been developed for industrial use and is located in an area zoned for heavy industrial development. Terrestrial wildlife who use the general area are habituated to industrial activity.</li> <li>• Construction of the pipelines will comply with the requirements for Class II pipelines as presented in the Guide for Pipelines Pursuant to the Environmental Protection and Enhancement Act and Regulations (AER 1994).</li> <li>• Machines and equipment will be turned off when not in use and idling will be minimized.</li> <li>• AES will develop and implement a Traffic Management Plan to manage and direct construction traffic on local roads and construction sites.</li> <li>• AES will adhere to the recommended construction timing windows and restrictions where practicable.</li> <li>• If a wildlife feature of concern (e.g. sharp tailed grouse lek, hibernacula) is encountered, AES will implement the Discovery of Suspected Wildlife Habitat or Features of Concern Contingency Plan (refer to Section 18 of the DPD).</li> <li>• If adherence to the timing windows and restrictions is not possible (i.e., work must occur within a restricted activity period), AES will develop a site-specific mitigation and monitoring plan in consultation with the applicable contractor, the appropriate regulatory authorities, and required Resource Specialist(s).</li> <li>• AES may provide the appropriate Resource Specialist, if required, to assess sensitive features and to inspect or monitor Project activities. AES, the contractor, the contractor’s sub-contractor(s) and all other personnel at the Project Site are prohibited from feeding or harassing wildlife.</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• Operations personnel and contractors will be prohibited from feeding or harassing wildlife.</li> <li>• Machines and equipment will be turned off when not in use and idling will be minimized.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>The Project is located in a heavy industrial area and is sited on previously disturbed lands. The Project Site has been developed for industrial use and is located in an area zoned for heavy industrial development. Terrestrial wildlife who use the general area are habituated to industrial activity. Lands to be disturbed have limited habitat value and it is predicted that most wildlife, including migratory birds, will favour the 30 m vegetated buffer surrounding wetland W3 and the wetland complex surrounding Astotin Creek outside of the Project footprint.</p> <p>Any effects would be <b>infrequent, short-term, reversible and limited to the Project Site.</b> Existing regulatory mechanisms and industry best practices would be followed as applicable.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 15: Terrestrial Environment – Wildlife and Migratory Birds

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<p><b>Survival and reproduction</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Construction traffic</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>N./A</li> </ul>	<p>Increase in vehicle traffic on the Project Site as a result of construction activities could increase injury or mortality of wildlife due to vehicle strikes</p> <p>Construction of the Project will occur over a period of approximately 2.5 years and the construction workforce numbers will fluctuate over that time. The overall number of construction personnel on site will be approximately 175-200 at peak construction. An increase in personnel on a site can increase the risk of wildlife interactions and vehicle strikes without the implementation of technically and economically practicable mitigation measures.</p> <p>During operations, traffic to site will be limited to Project operators, other AES personnel and select contractors as required. Traffic signs (e.g. speed limits) will be posted at the site over the life of the facility.</p> <p><i>NOTE: The increased likelihood of vehicle strikes on public roads is outside of the care and control of AES and the Project is not expected to materially increase vehicles on public highway and traffic on local roads will be managed in accordance with a Traffic Management Plan. s Mitigation measures are focused on potential for vehicle strikes or other interactions on the Project Site.</i></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>AES will develop and implement a Traffic Management Plan to comply with requirements for a Development Permit from Strathcona County and to manage and direct construction traffic on local roads and construction sites. This plan will include requirements for:               <ul style="list-style-type: none"> <li>Maximum speed limits, including lower limits under specific conditions and for certain areas</li> <li>Yielding to wildlife on roads when it is safe to do so</li> <li>Taking corrective action if Project personnel are observed not following the Plan</li> <li>Reporting vehicle wildlife incidents</li> </ul> </li> <li>AES will require Project personnel to report wildlife sightings, issues and incidents with wildlife or nuisance wildlife as soon as it is safe to do so and will be responsible for determining corrective and/or emergency action to be taken and for ensuring any required regulatory reporting.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>The potential for accidental strikes is expected to be <b>limited to the Project Site</b> and <b>unlikely</b>. Traffic within the Project Site will be managed through <b>best industry practices</b> including implementation of a Traffic Management Plan and will include requirements for Project personnel to report wildlife sightings. Increased traffic will be <b>short-term</b>. Any effects of vehicle strikes on individual wildlife or birds are not expected to affect the overall population of any species and are considered <b>reversible</b>.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 15: Terrestrial Environment – Wildlife and Migratory Birds

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>N/A</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>Brine storage</li> </ul>	<p>Addition of open-topped brine storage (pond or tanks) at the start of the operations phase may increase injury or mortality of wildlife due to accidental entry into brine storage area</p> <p>The existing Strathcona Salt Cavern Storage Facility has operated a brine pond at the Project Site since 2016 with no adverse effects to migratory birds or terrestrial wildlife.</p>	<p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>The brine system will be equipped with brine degasification facilities to ensure gaseous and liquid hydrocarbons are prevented from entering the pond.</li> <li>The brine storage area will be fully fenced to prevent land animals from accessing the pond.</li> <li>Vegetation surrounding the brine pond berm or brine storage areas will be removed to discourage nesting by waterfowl.</li> <li>Project personnel will be required to check for evidence of wildlife activity during routine inspections of the brine storage areas.</li> <li>AES will minimize potential disturbance to wildlife and migratory birds that make use of Wetland W3 by limiting operations activities in the 30 m buffer surrounding Wetland W3 and limiting vegetation management activities in the 30 m wetland buffer to removal of weeds and vegetation that presents an HSE risk.</li> <li>If wildlife is observed in the brine storage area, AES will evaluate the implementation of a deterrent system. Since operation of the existing brine pond began in 2016, no migratory birds have been observed in the brine pond or have been observed to be preferentially attracted to the brine pond.</li> <li>AES will obtain an amendment to its existing EPEA Approval 357248-00-01 for the storage of brine and will be required to demonstrate protective measures for wildlife and birds prior to obtaining approval.</li> </ul> <p>AES will complete inspection and monitoring conditions associated with the provincial regulatory approvals for the brine storage area, including approval terms and conditions from EPEA Approval 357248-00-01, as amended.</p>	<p><b>No Measurable Residual Effect</b></p> <p>Wildlife and birds have not shown preferential interest in the existing brine pond at site and it is expected that wildlife and migratory birds will continue to prefer the habitat provided by Wetland W3 or the wetland complex associated with Astotin Creek.</p> <p>The potential effect is <b>limited to the Project Site, long-term</b> in duration and <b>reversible</b>. At facility end of life, the brine storage area will be decommissioned, recontoured, and returned to equivalent capability.</p> <p>Existing mitigation measures to prevent migratory birds and land animals from accessing the current brine pond appear to be successful, will be applied to the new brine storage area, and will be continuously reviewed throughout the lifecycle of the Project. The potential effect is predicted to be <b>unlikely</b> to occur.</p> <p>To obtain the required EPEA Approval Amendment to construct and operate the brine storage required for the Project, AES will be required to demonstrate protective measures for wildlife and birds. The potential effects and mitigation measures are adequately regulated under <b>existing regulatory mechanisms</b>.</p>



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 15: Terrestrial Environment – Wildlife and Migratory Birds

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Soil salvage and stockpiling</li> <li>• Grading and drainage</li> <li>• Heavy equipment and earthworks</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Vegetation clearing and grading may increase injury or mortality of ground-dwelling birds due to accidental take.</p> <p>Vegetation clearing and grading are expected to occur on 16 hectares of NW 27-55-21-W4M which is currently cultivated for agricultural purposes and potentially 5 hectares of Lot D. There is potential that ground-dwelling birds may be nesting or otherwise using lands in NW-27 and clearing activities could result in accidental take of ground-dwelling birds without the implementation of technically and economically practicable mitigation measures.</p> <p>Vegetation clearing will not occur as part of Project operations. If vegetation removal is required, it will be limited to removal of weeds or site-specific removal of hazardous or nuisance vegetation.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will ensure construction activities adhere to the recommended construction timing windows and restrictions under the Migratory Bird Convention Act (1994) and AEP guidance where practicable.</li> <li>• If adherence to the timing windows and restrictions is not possible (i.e. work must occur within a restricted activity period), a site-specific mitigation and monitoring plan will be developed by AES prior to the activity being undertaken, in consultation with the applicable contractor, appropriate regulatory authorities, and required Resource Specialist(s).</li> <li>• All required wildlife surveys, including a pre-construction wildlife sweep, will be completed prior to start of construction (as well as a Prairie Raptor sweep).</li> <li>• If a wildlife feature of concern (e.g. sharp tailed grouse lek, hibernacula) is encountered, work will immediately stop and AES will evaluate the wildlife feature of concern and, if required, engage the assistance of a Resource Specialist or the appropriate municipal, provincial, or federal authorities.</li> <li>• If a wildlife feature of concern is identified, AES will abide by the required setbacks.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>Effects to ground-dwelling bird survival and reproduction are <b>unlikely</b> as a result of accidental take during clearing activities. A wildlife sweep will be completed prior to clearing. Vegetation clearing will take place outside of the restricted activity periods where practicable.</p> <p>Ground clearing will be <b>limited to the Project Site</b> and will be <b>short-term</b>, and steps will be taken to ensure that there are no ground-dwelling birds or other wildlife at the Project Site. Clearing activities will only occur at the beginning of a construction activity. It is expected that any effects would be <b>reversible</b> due to the availability of similar habitat. There are <b>existing regulatory mechanisms</b> to manage and mitigate potential adverse effects on ground-dwelling birds.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 4.4 Human Environment

Table 16: Human Environment – Archaeological, Physical and Cultural Heritage, and Paleontological Resources

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<p><b>Archaeological, Physical, and Cultural Heritage, and Paleontological potential</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Soil salvage and stockpiling</li> <li>• Grading and drainage</li> <li>• Heavy equipment and earthworks</li> <li>• Wetland/ creek crossing</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Construction activities may unearth archaeological, cultural heritage, or paleontological resources, resulting in loss of or damage to the resource</p> <p>The Project Site is located in an area where the land has been homesteaded since the early 1900s and occupied by Indigenous Peoples since pre-contact. The Project is also in an area with paleontological potential.</p> <p>Archaeological, cultural heritage, and paleontological resources could be damaged or lost as a result of construction activities without the application of technically and economically practicable mitigation measures.</p> <p>The Project is located in and adjacent to existing industrial developments. Discovery of archaeological resources is unlikely due to the extensive history of development and cultivation at the site.</p> <p>Indigenous Communities noted that potential archaeological or cultural heritage resources could be located in water bodies where they were washed from upstream locations and could be damaged by in-stream work in a water body.</p> <p>No ground disturbance is expected following completion of construction (i.e., during operation of the Project).</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will obtain Historical Resources Act (HRA) Approval prior to starting construction and will adhere to the conditions of the HRA Approval issued for the Project.</li> <li>• AES will ensure that all Project personnel understand that destruction or collection of archaeological resources by Project personnel is prohibited.</li> <li>• AES will develop and implement an ESC Plan (as discussed above) that will limit accidental unearthing of any artefacts that could be unearthed by erosion</li> <li>• The pipeline crossing of Astotin Creek will be directionally drilled and will not alter the bed or banks, which in turn will not result in effects to historical resources that may be present in Astotin Creek due to washing downstream from upper reaches of Astotin Creek or Astotin Lake.</li> <li>• AES will develop a Discovery of Heritage and Archaeological Resources Contingency Plan prior to commencing construction of the Project</li> <li>• In the event that previously unidentified heritage or archaeological resources (e.g., arrows heads, pottery fragments, fossils) are suspected or encountered during construction, work will stop.</li> <li>• Potential archaeological resources will be staked or flagged and no construction or clearing activities will be permitted within these staked or flagged areas until the appropriate regulatory authority, Resource Specialist(s) or affected stakeholder has been consulted.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>AES will obtain and abide by the conditions of the HRA Approval under <b>existing regulatory mechanisms</b> to manage these resources. Construction activities will be <b>short-term</b> and ground disturbance will be <b>limited to the Project Site</b> approved under the HRA.</p> <p>AES will implement appropriate ESC measures to mitigate potential effects to archaeological, cultural heritage, or paleontological resources that may be undiscovered and located in wetlands or water bodies. The crossing of Astotin Creek will be directionally drilled and will not disturb any archaeological, cultural heritage, or paleontological resources that may be located in a marine environment and that were washed down from further upstream.</p> <p>No resources were found during the construction of the existing facility at the site of the proposed Project. Discovery is expected to be <b>unlikely</b>. In the event of an incidental discovery, AES will comply with all associated regulatory requirements. AES is committed to working with potentially affected stakeholders.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 17: Human Environment – Socio-economics

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<p><b>Employment and Procurement</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Employment and procurement</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• Employment and procurement</li> </ul>	<p>Procurement of materials, goods and services during construction could affect local and regional business revenues and requirements.</p> <p>Construction activities will occur for a period of two and a half years and will include a diverse scope of activities, including drilling, construction of surface facilities, and construction of pipelines. As AES does not readily have these personnel on staff, a temporary workforce of contractors will be engaged throughout Project construction. Approximately 400 to 450 direct jobs are expected to be required during construction.</p> <p>The operations phase will result in approximately four permanent operator jobs and indirect employment through procurement of maintenance services from local companies.</p> <p>The effect of temporary employment is considered positive as it will increase indirect benefits through induction of capital into the local economy.</p>	<p><u>Construction and Operations Phases:</u></p> <ul style="list-style-type: none"> <li>• AES will hire or contract qualified personnel from the Regional Area where practicable and support local and regional procurement where practicable. The majority of goods and services, and the majority of labour are expected to be sourced regionally.</li> <li>• AES will continue to support and prioritize employment and procurement opportunities for qualified Indigenous candidates.</li> <li>• AES has hiring practices that are inclusive of vulnerable populations. AES will look at specific employment measures for uplifting and educating vulnerable members of Indigenous Communities and other vulnerable groups and will work towards removing barriers to participation in economic opportunities created by the Project.</li> <li>• AES commits to Diversity and Inclusion in hiring practices.</li> <li>• Jobs will also be posted to job boards to promote the employment and uplift of diversity. These boards include job boards specific to women in oil and gas, and boards like Working Warriors, which is a job board for Indigenous workers in Canada.</li> <li>• Permanent job postings will not imply a gender, cultural, or orientation-bias and will be peer-reviewed to ensure that postings do not display an unconscious bias.</li> </ul>	<p><b>Residual effect - Minor</b></p> <p>A <b>short-term, continuous</b> increase in employment, work and generation of income in the Local and Regional areas is <b>certain</b> during construction. During operations, a long-term, minimal increase is expected from permanent employment and ongoing maintenance.</p> <p>The effect is expected to be positive in direction and would extend across the <b>Regional Area</b>, as the majority of contractors are expected to be sourced from Strathcona County or the Edmonton Capital Region and operators would be local to the region.</p> <p>AES' hiring and procurement practices are aligned with <b>best industry practices</b>.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 17: Human Environment – Socio-economics

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<p><b>Capacity of emergency and protective services</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Employment and procurement</li> <li>• Construction traffic</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Increase in temporary workers during construction could increase demand on emergency and protective services</p> <p>Construction personnel who travel from outside the region may need to use emergency medical services for injuries or illnesses that would not otherwise be treated by the local health authority, resulting in an increased strain on emergency and protective services.</p> <p>Operation of the Project is not expected to increase the regional population. It is expected that Project personnel will reside in the area and use of protective and emergency services by these personnel will have been considered by municipal and provincial governments as part of capacity planning.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will support hiring of local qualified personnel where practicable and support local and regional procurement where practicable, limiting any residual effect on emergency or protective services.</li> <li>• Temporary workers hired from outside the local area are not expected to permanently relocate themselves or their families to the area.</li> <li>• AES will ensure that adequate first aid stations are available at the Project Site and that an adequate number of Project personnel are trained in first aid, as required by the Alberta Occupational Health and Safety Act (OHS Act), Regulation and Code.</li> <li>• AES complies with requirements of the Alberta OHS Act, Regulation and Code to minimize the risk of any workplace incidents including hazard identification, risk assessment and effective mitigations, and personnel training. Project construction activities will be undertaken with appropriate safety measures in place. AES has a strong safety record on construction projects.</li> <li>• AES will maintain a zero-tolerance policy toward workers being under the influence of drugs or alcohol while working or while travelling to or from work.</li> <li>• The Project Site will be drug- and alcohol-free.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>It is unlikely that the increased employment from the project will result in additional demand on the capacity of emergency and protective services. The increase in temporary workforce is expected to be sourced locally, resulting in a limited net increase on the capacity of emergency or protective services in the <b>Regional Area</b>. Stress on existing services from additional workers in the area is not expected.</p> <p>The Project will adhere to all applicable health and safety legislation and AES has safety programs and contractor requirements to minimize or eliminate safety incidents during construction.</p> <p>The demand is expected to be <b>short term</b> and to end with completion of Project construction (<b>reversible</b>).</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 17: Human Environment – Socio-economics

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<b>Availability of temporary accommodation</b>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Employment and procurement</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Increase in temporary accommodation required during construction could stress existing demand and supply of temporary accommodations</p> <p>At construction peak, approximately 175 to 200 workers are expected to be on site. Although AES will attempt to locally source construction works from the regional assessment area, some workers may need to travel and stay overnight near the Project.</p> <p>The addition of a temporary workforce can put pressure on existing temporary accommodation and displace local residents who make use of temporary accommodation.</p> <p>The Project personnel hired for long term operation of the Project are expected to reside in the region and will not need to make use of temporary accommodations as part of Project operations.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Few temporary workers from out of area are expected to work on the Project; those that do will be encouraged to stay in purpose-built temporary accommodation (i.e., hotels).</li> <li>• AES will support local hiring of qualified personnel where practicable.</li> <li>• AES will support local and regional procurement where practicable.</li> <li>• The Project will not induce in-migration that would place additional demand on temporary or short-term housing.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>The effect is expected to be neutral and would extend across the <b>Regional Area</b>. It is also expected to be <b>short-term</b> and <b>intermittent</b> over the Construction Phase and negligible over the Operations Phase. The number of temporary workers is relatively low as compared to other projects in the local and regional areas and small due to the number of contractors expected to be already local to the Regional Area.</p> <p>The Project Site is located in an area that has extensive temporary accommodation (i.e. hotels) to accommodate temporary workers from outside the local area or AES employees from other regions supporting the project and is located in an area that is well suited to accommodate temporary workers.</p>
<b>Well being of vulnerable populations</b>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Employment and procurement</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Increase in temporary workers and contractors during construction could result in adverse effects to vulnerable populations due to lack of awareness of cultural values or race, gender-based or other discrimination.</p> <p>Construction of the Project will require a temporary workforce that will peak at approximately 175 to 200 temporary workers on site. Several Indigenous Communities expressed concerns around treatment of Indigenous peoples by members of temporary workforces.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Due to the project location there is no need for the provision of group housing or temporary accommodations.</li> <li>• The Project is located in an area zoned for industrial use and is also used for agricultural purposes. Incidental interactions between Project personnel and potentially vulnerable members of the local or regional population are not expected to occur at the Project Site.</li> <li>• Few temporary workers from out of area are expected to work on the Project; those that do are expected to stay in purpose-built temporary accommodation (i.e. hotels) throughout the regional area for short durations.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>The number of temporary workers is relatively low and will be phased throughout construction.</p> <p>Temporary workers that are not from the local area are not expected to remain in the local area during days off or for prolonged periods and would be expected to stay in a variety of local hotels. Temporary workers that are from the local area would be in the</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 17: Human Environment – Socio-economics

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
		<p>The Project Site itself is located within the AIH in a largely industrial and agricultural area and it is expected that Project personnel would remain onsite throughout daily work duties and would not be interacting with any members of the community while at the Project Site.</p> <p>Additional concerns around the well being of Indigenous women and girls were also received. Although the temporary workforce will be small in comparison to other capital projects in the area, a small proportion of temporary workers are expected to be coming from outside of the area and would be expected to stay in temporary accommodation in nearby population centres. There is a potential that temporary workers hired for the purposes of construction could have negative interactions with vulnerable people in the local community or on the work site.</p> <p>The mitigation measures listed for construction are also expected to be applied throughout the operations phase, as applicable.</p>	<ul style="list-style-type: none"> <li>• Individuals unaffiliated with Project construction activities (i.e., individuals who are not employed by AES or by the contractor or affiliated with any inspection and monitoring activities) will not be permitted on site.</li> <li>• Vulnerable populations are only expected to be exposed to the Project Site if they are part of the temporary or permanent workforce hired for the proposed Project activities.</li> <li>• AES has a Diversity &amp; Inclusion Committee underpinned by short and long-term goals to embed diversity and inclusion within the organization.</li> <li>• AES has a Violence and Harassment Policy and Prevention Plan and enforcement action will be taken for discrimination or harassment.</li> <li>• AES will investigate any reported incidents of harassment or violence related to Project personnel in accordance with the <i>OHS Act</i> and the <i>Alberta Human Rights Act</i>.</li> <li>• If an employee or contractor is found to be acting in a harassing, threatening, or illegal manner, the employer will implement disciplinary actions up to and including termination of the employee or reporting the employee's actions to the appropriate authorities</li> <li>• All AES employees are required to complete Indigenous Cultural Awareness training to understand the history of Indigenous Peoples and current issues and concerns facing Indigenous Peoples.</li> <li>• AES will consider offering this training to contractors if it not provided through the selected vendors.</li> <li>• AES Employees who will be working directly with Indigenous Communities, Indigenous Contractors, or other Indigenous-focused populations are also provided training on the history, culture and the legal and traditional rights of Indigenous Peoples in Canada.</li> </ul>	<p>local area regardless of the proposed Project.</p> <p>Construction is expected to be short-term, and the influx of temporary workers will be infrequent and staggered and dispersed throughout the regional area. The risk that temporary workers may negatively interact with vulnerable members of the community is assumed to be mitigated through workplace violence and harassment training, and communication of corrective actions that will be implemented if harassment or violence occurs.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 18: Human Environment – Indigenous Peoples

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
<p><b>Indigenous current use of lands and resources for traditional purposes</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>Construction activities</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>Operations activities</li> </ul>	<p>Project construction and operation activities may affect use of surrounding lands for traditional purposes by Indigenous peoples.</p> <p>The Project is located on privately owned land that has been privately owned and cultivated for many years. There is an existing facility operating on the Project lands. The pipeline ROW is also located on privately held lands.</p> <p>The lands surrounding the Project Site are privately owned and are largely cultivated or developed. AES is not aware of any traditional land and resource use by Indigenous Communities on the Project lands or adjacent lands. The Project is located in an area that AES understands is already avoided for traditional land use purposes due to existing heavy industrial development. The Project is not anticipated to result in increased avoidance of the area or any preferential use areas, nor block or remove access to preferred use areas.</p> <p>The Project is not expected to affect water quality or quantity, wildlife or wildlife habitat, traditional and medicinal plants, or spiritual use sites due to the extensive history of cultivation and development in the area and the very limited potential for any of the minor residual effects from the Project to cross the boundary of the Project Site.</p> <p>As stated above, the Project is not expected to affect fish or fish habitat.</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>The Project footprint will be sited entirely on privately-owned (i.e. non-Crown) lands.</li> <li>Access constructed for the proposed Project will connect AES' land to an existing Range Road within Strathcona County and will not impact any Crown land. No increased access to Crown land which may be used for traditional purposes will result from the Project.</li> <li>AES will review protective and mitigative measures with the Contractor.</li> <li>AES and the Contractor will follow all mitigation measures described to mitigate effects to the biophysical environment.</li> <li>If Indigenous Communities identify areas of traditional use that may be affected by the Project, AES will engage the community to determine appropriate mitigation. As per discussions with Indigenous Communities to date, follow may include engagement with the Alberta Aboriginal Consultation Office, a Resource Specialist, or Indigenous Communities</li> <li>AES will be responsible for ongoing Indigenous engagement throughout the lifecycle of the asset and will consider feedback on ways to enhance the experience on the landscape.</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>AES will follow all mitigation measures described to mitigate effects to the physical, aquatic and terrestrial environments.</li> <li>The Project footprint will be sited entirely on privately-owned (i.e., non-Crown) lands.</li> <li>AES will be responsible for ongoing Indigenous engagement throughout the lifecycle of the asset.</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>As the Project will be located on privately owned land that is zoned for heavy industrial use by Strathcona County and is located within the AIH in proximity to other heavy industrial sites, there is limited potential for terrestrial Indigenous harvesting or other rights in the area to be impacted by the Project. No traditional uses of the proposed Project Site by Indigenous groups or peoples have been identified in previous regional studies for the area (Stantec 2010; Stantec 2013). There is no current traditional land use within the Project Site, which is currently utilized for AES' existing Strathcona Salt Cavern Storage Facility.</p> <p>The Project Site is not currently available for traditional use. Private ownership and existing development in the AIH has resulted in existing avoidance of the area for Traditional Purposes. The Project is not expected to increase avoidance in the region, nor will it encroach on or increase access to Crown Land areas that may be preferred for Traditional Uses.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 18: Human Environment – Indigenous Peoples

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
		<p>The Project lands are in an area where traditional land use was practiced by Indigenous Communities for thousands of years. The changes that have occurred in the Alberta Industrial Heartland have occurred within recent history.</p> <p>Development of the Project may impact Indigenous cultural and experiential connections to the land, as it will add to existing development in the area.</p> <p>Due to the lifecycle of the Project, AES acknowledges that the Project may affect Traditional Knowledge associated specifically with the site.</p>		<p>The Project is not expected to affect water quality or quantity, wildlife or wildlife habitat, traditional and medicinal plants, or spiritual use sites due to the extensive history of cultivation and development in the area and the very limited potential for any of the minor residual effects from the Project to cross the boundary of the Project Site.</p>
<p><b>Indigenous Physical and Cultural Heritage and Historical, Archaeological and Palaeontological Resources</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Soil salvage and stockpiling</li> <li>• Grading and drainage</li> <li>• Heavy equipment and earthworks</li> <li>• Wetland/creek crossings</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Construction activities may unearth historical, archaeological, paleontological or architectural resources of significance to Indigenous peoples, resulting in loss of or damage to the resource without the application of technically and economically practicable mitigation measures.</p> <p>The Project Site is located in an area that has been occupied by Indigenous peoples since pre-contact.</p> <p>Indigenous stakeholders noted that potential archaeological or cultural heritage resources could be located in water bodies where they were washed from upstream locations and could be damaged by in-stream work in a water body.</p> <p>No ground disturbance is expected following completion of construction (i.e., during operation of the Project).</p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• AES will obtain HRA Approval prior to starting construction and will adhere to the conditions of the HRA Approval issued for the Project.</li> <li>• If an artefact may be Indigenous in origin, AES will work with potentially affected Indigenous communities and the appropriate regulatory authorities to determine appropriate assessment measures. AES will ensure that all Project personnel understand that destruction or collection of archaeological resources by Project personnel is prohibited.</li> <li>• AES will develop and implement an ESC Plan (as discussed above) that will limit accidental unearthing of any artefacts that could be unearthed by erosion.</li> <li>• The pipeline crossing of Astotin Creek will be directionally drilled and will not alter the bed or banks, which in turn will not result in effects to historical resources that may be present in Astotin Creek due to washing downstream from upper reaches of Astotin Creek or Astotin Lake.</li> <li>• AES will develop a Discovery of Heritage and Archaeological Resources Contingency Plan prior to commencing construction of the Project</li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>AES will obtain and abide by the conditions of the HRA Approval under <b>existing regulatory mechanisms</b> to manage these resources. Construction activities will be <b>short-term</b> and ground disturbance will be <b>limited to the Project Site</b> approved under the HRA.</p> <p>Indigenous Communities have indicated knowledge of trails and potential for gravesites or other cultural heritage resources in the regional assessment area. AES will implement appropriate ESC measures to mitigate potential effects to archaeological, cultural heritage, or paleontological resources that may be undiscovered and located in wetlands or water bodies. The crossing of Astotin Creek will be directionally drilled and will not disturb any archaeological, cultural</p>



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 18: Human Environment – Indigenous Peoples

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
			<ul style="list-style-type: none"> <li>In the event that previously unidentified heritage or archaeological resources (e.g., arrows heads, pottery fragments, fossils) are suspected or encountered during construction, work will stop.</li> <li>Potential archaeological resources will be staked or flagged and no construction or clearing activities will be permitted within these staked or flagged areas until the appropriate regulatory authority, Resource Specialist(s) or affected stakeholder has been consulted.</li> <li>As a result of the engagement and discussion for the Project, AES will consider adding to its existing activities, other programs, policies and/or opportunities which support social and cultural enhancement and economic participation which positively impact and accommodate Indigenous traditional economic or cultural activities.</li> </ul>	<p>heritage, or paleontological resources that may be located in a marine environment and were washed down from further upstream. The potential effects would occur during ground disturbance during construction. The potential effect is considered short-term, and the likelihood of encountering an historical resource is considered unlikely.</p> <p>Mitigation measures around the identification and conservation of potential historical resources will mitigate any potential effects to previously unidentified resources of significance to Indigenous peoples. AES will inform interested Indigenous communities if discovery of a suspected Indigenous resource is encountered and all measures will be taken to protect the resource from future damage or degradation in accordance with applicable law.</p>
<b>Acoustic and Visual Environment</b>	<u>Construction Phase:</u> <ul style="list-style-type: none"> <li>Soil salvage and stockpiling</li> <li>Grading and drainage</li> <li>Heavy equipment and earthworks</li> <li>Construction traffic</li> </ul>	<p>Change to the visual and acoustic environment due to addition of built structures and noise-emitting equipment could disrupt current use of lands for traditional purposes.</p> <p>Project construction activities could disrupt familial or community land use teaching practices through disruption of the visual and acoustic environment surrounding the Project Site, reducing the ability for Indigenous Peoples to practice land use at traditional sites in proximity to the Project without the implementation of technically and economically practicable mitigation measures.</p>	<u>Construction Phase:</u> <ul style="list-style-type: none"> <li>The Project Site and the pipeline ROW are not visible from the North Saskatchewan River, which is an important corridor for traditional harvesting, fishing, hunting, navigation, and spiritual use to Indigenous Communities.</li> <li>Access to the Project Site and the pipeline ROW will be conducted using existing and built roads. No point of access to the Project could provide additional access to Crown lands where TLU activities may be taking place.</li> <li>AES will comply with the requirements of Directive 038: Noise Control (AER 2007) regarding construction noise including:               <ul style="list-style-type: none"> <li>Construction activities will occur between 07:00 and 19:00 to reduce the potential effect of construction noise.</li> </ul> </li> </ul>	<p><b>No Measurable Residual Effect</b></p> <p>The Project Site will be developed at and adjacent to existing industrial development. It is unlikely that there are any Traditional Land Use areas in close proximity to the Project Site or pipeline ROW that would be disturbed during construction or operation of the Project or would otherwise be affected by the expansion.</p> <p>AES is unaware of any current Traditional Land Use practices on the Project Sites or in the</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 18: Human Environment – Indigenous Peoples

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
	<ul style="list-style-type: none"> <li>• Wetland/ creek crossing</li> <li>• Drilling</li> </ul> <p>Operations Phase:</p> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<p>Due to noise dampening measures listed above and the Project setback from any known traditional use areas, the effect has been considered fully mitigated and was not carried through to the operations phase.</p>	<ul style="list-style-type: none"> <li>○ All internal combustion engines used for construction will be fitted with appropriate muffler systems.</li> <li>• Where practicable, Project personnel will complete noise-emitting activities where existing buildings and developments on the Project Site may shield dwellings in the Local Assessment Area from construction equipment noise.</li> <li>• If a complaint is received regarding noise during construction, AES will respond expeditiously and take appropriate action to ensure that the issue has been managed responsibly.</li> <li>• Erosion and dust during construction will be minimized through the use of an ESC Plan and Dust Control Plan.</li> <li>• Construction cleanup and reclamation is completed as soon as possible after construction ends.</li> <li>• Vegetation clearing within a 30 m buffer surrounding wetlands and water bodies is limited to where required for crossings or if vegetation presents a hazard during construction or operations.</li> <li>• Grading on slopes prone to erosion or steep slopes will be limited.</li> </ul>	<p>Local Assessment Area. AES considered the possibility of the Project intersecting with waterways that could be used to access lands used for Traditional Purposes. Astotin Creek is not considered to be a navigable water (TEPCA 2007) and the closest navigable waters are the North Saskatchewan River or Beaverhill Creek downstream of the confluence with Astotin Creek (TEPCA 2007), which meet approximately 9 kilometres away from the Project Site.</p> <p>If there are any existing TLU areas in close proximity to the Project, it is unlikely that the <b>short term</b> duration of construction would affect use of that site in consideration of the existing industrial development in the area and the <b>infrequent</b> nature of the construction activities (i.e., construction will consist of multiple activities in short durations on the Project Site and the pipeline ROW). Any effect will be limited to the <b>Local Assessment Area</b> and <b>will be reversible</b>.</p> <p>Environmental residual effects (including sensory and visual disturbance) of project are negligible or minor and are not expected to result in effects to resources relied on by Indigenous communities (water, wildlife, plants, etc.). The Project Site is in area of existing disturbance and heavy industrial activity, and construction activities are</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 18: Human Environment – Indigenous Peoples

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures (including Inspection and Monitoring)	Residual Effect
				<p>unlikely to result in significant incremental sensory disturbance.</p> <p>The Project will not result in a change to the visual landscape surrounding the North Saskatchewan River or any nearby Crown land.</p>
<p><b>Indigenous Employment and Procurement</b></p>	<p><u>Construction Phase:</u></p> <ul style="list-style-type: none"> <li>• Employment and procurement</li> </ul> <p><u>Operations Phase:</u></p> <ul style="list-style-type: none"> <li>• Employment and procurement</li> </ul>	<p>Procurement of materials, goods and services, and employment of Project personnel and contractors during construction and operations could affect Indigenous business revenues and requirements, and incomes of Indigenous peoples.</p> <p>Economic participation is woven into AES's procurement approach. AES looks for opportunities to implement Indigenous contracting strategies to help create jobs, opportunities for skill training, and local economic development. Indigenous economic participation is considered positive in direction as it increases opportunities for Indigenous Communities to participate in the local economy and indirectly injects cash into the local economy.</p>	<p><u>Construction and Operations Phases:</u></p> <ul style="list-style-type: none"> <li>• AES will hire or contract qualified personnel from the Regional Area where practicable and support local and regional procurement where practicable. The majority of goods and services, and the majority of labour are expected to be sourced regionally.</li> <li>• AES will continue to support and prioritize employment and procurement opportunities for qualified Indigenous candidates.</li> <li>• AES has hiring practices that are inclusive of vulnerable populations. AES will look at specific employment measures for uplifting and educating vulnerable members of Indigenous Communities and other vulnerable groups and will work towards removing barriers to participation in economic opportunities created by the Project.</li> <li>• AES will encourage and track contracts with Indigenous-owned businesses.</li> <li>• AES will communicate application deadlines and requirements for Indigenous summer student and scholarship opportunities as part of ongoing Project engagement.</li> <li>• AES commits to Diversity and Inclusion in hiring practices.</li> <li>• As part of engagement for the Project, AES has discussed and will consider measures that support Indigenous cultural and traditional practices while participating in the local economy, including leave during harvesting times and promoting the use of Indigenous language as part of Project naming conventions, which can also support preserving Indigenous language over time.</li> </ul>	<p><b>Residual Effect – Minor</b></p> <p>A slight increase in Indigenous procurement and employment is expected as a direct result of the Project and AES' commitments to Indigenous employment and procurement practices. In the event that Indigenous Communities are engaged but not employed or contracted to provide goods or services related to this Project, the engagement process will allow AES to develop relationships with Indigenous Groups who could support other projects being undertaken by ATCO.</p> <p>The effect is expected to be <b>long term</b> and extend from the life of the Project into decommissioning and reclamation. The effect will extend beyond the <b>Regional Assessment Area</b>, as relationships with Indigenous Communities extend beyond the boundaries of the AIH. Although the Project may result in permanent jobs or provide transferable training, the effect is considered <b>intermittent</b></p>

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Table 18: Human Environment – Indigenous Peoples

Indicator	Project Specific Activity	Pathway and Description/Context of Potential Project-Environment Interaction	Mitigation Measures <i>(including Inspection and Monitoring)</i>	Residual Effect
			<ul style="list-style-type: none"> <li>• All AES employees are required to complete Indigenous Cultural Awareness training to understand the history of Indigenous Peoples and current issues and concerns facing Indigenous Peoples.</li> <li>• AES will consider offering this training to contractors if it not provided through the selected vendors.</li> <li>• AES Employees who will be working directly with Indigenous Communities, Indigenous Contractors, or other Indigenous-focused populations are also provided training on the history, culture and the legal and traditional rights of Indigenous Peoples in Canada.</li> </ul> <p><i>AES will track contracts with Indigenous-owned business and report results for inclusion in the ATCO Sustainability Report.</i></p>	<p>due to the limited number of contractors required throughout the life of the Project.</p>

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 5.0 SUMMARY OF RESIDUAL EFFECTS

This section summarizes the residual effects or potential residual effects predicted as a result of the proposed Project from the assessment performed in Section 4.

No moderate and no major residual effects were predicted as a result of the proposed Project. Table 19 summarizes those VCs and indicators where Minor Residual Effects were predicted and summarizes the extent of those effects. Where multiple pathways were evaluated for one indicator, the largest residual effect was used for the summary.

*Table 19: VCs and Indicators with Minor Residual Effects*

Valued Component	Indicator	Residual Effect	Extent of Residual Effect	Existing Regulatory Processes to Manage Residual Effect
Air Quality	Greenhouse Gas Emissions	Residual Effect - Minor	Regional	EPEA, MGA
Surface Water	Surface Water Quantity	Residual Effect - Minor	Project Site	EPEA, Water Act, MGA
Surface Water	Surface Water Quality	Residual Effect - Minor	Project Site	EPEA, Water Act, MGA
Vegetation & Wetlands	Ecosystem Availability and Distribution	Residual Effect - Minor	Project Site	EPEA, Water Act, MGA
Socioeconomics	Employment and Procurement	Residual Effect - Minor	Regional	N/A
Indigenous Peoples	Indigenous Employment and Procurement	Residual Effect - Minor	Regional	N/A

Effects on employment and procurement (including Indigenous employment and procurement) are expected to be neutral or positive in direction.

The remaining Minor Residual Effects predicted for the Project will be monitored and managed in accordance with applicable provincial legislation and the terms and conditions of existing, amended and new regulatory approvals required for the Project. In particular, these include the EPEA, the Water Act, the Municipal Government Act (MGA), and their respective regulations and requirements. In the event that effects associated with the Project are greater than anticipated or result in exceedances of any applicable environmental thresholds, there are existing regulatory management systems and mechanisms in place that would apply, including the potential for compliance and enforcement measures to be taken by provincial and municipal regulators.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 6.0 EFFECTS OF POTENTIAL ACCIDENTS AND MALFUNCTIONS

Questions were raised during the IAAC-led engagement process with respect to risks and effects of potential accidents and malfunctions involving Project infrastructure, including the brine pond, storage caverns, pipelines and pressurized vessels, as well as potential mitigation measures. Issues regarding spill prevention, preparedness and response, and emergency response were also identified.

Potential accidents and malfunctions are considered in the design of the Project, and AES is required to have in place Project-specific emergency response plans approved by the AER that will guide AES' response to accidents and malfunctions should they occur.

Similarly, AES has existing spill prevention and response plans in place for the existing Strathcona Salt Cavern Storage Facility, which will be amended for the Project and, AES is an active member of the Western Canadian Spill Services Co-op (WCSS).

Potential accidents and malfunctions associated with the Project, as well as applicable mitigation measures, emergency preparedness and response, and spill preparedness and response measures, are discussed below.

It is important to note that there is a robust regulatory oversight system in place to minimize risks of accidents and malfunctions associated with the Project through minimum standards and requirements for the safe design, construction and operation of the Project. In order to obtain provincial regulatory approvals for the Project, AES will be required to satisfy the AER and other regulators that the risks of potential accidents and malfunctions associated with the Project will be appropriately managed and mitigated to prevent effects to the environment and human health and safety. This includes undertaking any required risk assessments, including sufficient design and other mitigation measures, prior to obtaining approval to operate.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 6.1 Potential Effects of, and Mitigation Measures to Prevent Accidents and Malfunctions

This section discusses potential accidents and malfunction of project works, their potential effects and planned mitigation measures to eliminate or minimize the potential for these events. Potential environmental, health, social and economic effects on aquatic and terrestrial environments and on human health are discussed. Accidents or malfunctions would typically be caused by inadequate design or materials, human error, or exceptional natural events which could have a resulting adverse effect.

### 1. Brine Pond and other Containment Structures

- Potential accidents and malfunctions involving infrastructure associated with the brine pond would be limited to:
  - A brine pond berm failure resulting in a dam breach, releasing brine to areas within approximately 800 metres, causing chloride contamination of groundwater and wetlands. A brine spill from a dam breach would not reach local residents as they are at higher elevation. Causes could be improper design, poor construction, neglect of monitoring requirements, or natural disasters such as an earthquake.
  - Leak in the primary and secondary liner, leaking brine into the groundwater below the pond. Causes would be deficient design, construction, or inspection during installation of the liners, or natural disasters such as an earthquake.
- The existing brine pond at the Project Site is regulated under EPEA Approval 357248-00-01, as amended, Water Act Approvals 359583-00-00 and 369589-00-00, and the AER Dam and Canal Safety Directive.

#### Berm Failure Prevention

- The following design, construction and operations activities and requirements minimize or eliminate the potential for a berm failure. Prior to initial operation, design and engineering of the brine pond are approved by the AER.
  - A detailed geotechnical investigation will be undertaken to characterize subsurface soil and groundwater conditions to ensure that correct soil and groundwater properties are used in the design
  - A slope stability assessment will be performed to ensure that the berms of the pond will remain stable and slopes will be monitored over the life of the facility
  - Proper safety design factors specific to the local area will be utilized
  - The pond will be designed for the local seismic zone

## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

- The brine pond will be designed by a formal Designer of Record, meeting the qualifications and design requirements set out in the Water Act and the AER Dam and Canal Safety Directive and ensuring the design meets accepted best practice standards and regulatory requirements and that the pond is built according to the design
- Quality will be monitored and inspected during construction to ensure the brine pond is built as per its design
- The brine pond will be overseen by an Engineer of Record, meeting the qualifications and design requirements set out in the Water Act and the AER Dam and Canal Safety Directive, including performing various inspections and performance monitoring, and submission of routine and periodic reports to the AER
- The brine pond berm will be monitored using permanently installed instrumentation to provide early indication of any slope stability concerns, which would allow the pond to be drained and any maintenance work performed as required
- Alarms and setpoints are in place associated with brine pond and leachate levels to monitor fluid levels and prevent overflowing of the brine pond and leak collection sump
- The brine pond is operated, maintained and monitored as per AES' Dam Safety and Integrity OMS Manual, (required by the AER) which prescribes responsibilities and activities required to maintain the integrity of the pond for the duration of operation.
- Inspection and monitoring of the brine pond will be conducted in accordance with the approval conditions of EPEA Approval 357248-00-01, as amended, and the Water Act Approvals required to construct and operate the brine pond (Dam Safety) and to install and use the groundwater dewatering system. Inspections will be completed by a qualified professional and will be appropriate in accordance with the risk factors presented by the dam and the complexity of the dam structure. Comprehensive Dam Safety Reviews will be conducted every ten years.
- No changes to topography as a result of climate change (e.g., slumping due to excessive precipitation) are predicted. Any changes to the brine pond berm will be documented and investigated, as required as part of the AER Dam and Canal Safety Directive, and corrective or preventive measures will be put in place to prevent further reoccurrence.
- The likelihood of a brine pond berm failure is extremely limited because if any indication of changes to the integrity of the berms was detected or identified during operations, maintenance or surveillance activities, the pond would be drained to appropriate holding facilities or the brine would be disposed of in an AES approved brine disposal well before any effect to the surrounding area from any spill or contamination could occur. Any issues would be corrected fully prior to returning the pond to operation.



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## Liner Leak Prevention

- Other than a berm failure, accidents and malfunctions associated with the brine pond would be related to leaks through the primary and secondary liners.
- The primary leak detection system will be comprised of a grid of perforated piping between the primary and secondary HDPE liners, which collects any liquid (or leachate) that passes through the primary liner and conveys this leachate into a leachate collection well. Within the leachate collection well, a pump operated on level control will return the leachate back to the pond. The rate of leachate pumping will be monitored remotely, with a signal generated from a flowmeter on the pump discharge. A pumping rate that exceeds the allowable leakage rate, calculated in accordance with the Action Leakage Rate Guideline (AENV 1996) and approved as per the required EPEA Approval, would indicate excessive leakage in the primary liner and the need for repair. The secondary HDPE liner will provide containment of primary liner leakage. In the unlikely event that both the primary and secondary HDPE liners were to experience significant leakage, this leakage would be detected through the groundwater collection system beneath the secondary HDPE liner.
- The groundwater collection system will consist of a grid of perforated piping below the HDPE lining and leak detection systems, which will collect groundwater and convey it into a groundwater collection manhole. Within the collection manhole, pumps will begin operating on level control (i.e., when groundwater levels reach a set threshold) that will pump the groundwater to the brine pond in a closed loop system. Groundwater sampling within the collection system will be completed at regular intervals and any trends indicating a potential issue will be investigated immediately.
- Additional information on liner design, construction and operation, including ongoing monitoring and inspection activities performed over the life of the facility are detailed in Sections 9, 18 and 24 of the DPD.

## Other Containment Structures

- Should brine storage tanks be utilized, tank failure resulting in the release of brine to the surrounding site including wetland W3 and groundwater could occur due to material or construction defects or corrosion. The engineering and design of the tank system will be carried out and approved by experienced industry professionals using proven technologies and designs. AER approval would be required prior to use of the tanks to ensure sufficient protective and preventive measures were in place to protect the surrounding area.
- Quality inspection and monitoring programs, including the AES Pressure Equipment Integrity Manual (PEIM), will be in place during the construction and operation of the tanks, including maintenance to ensure their long-term integrity. Tank bases would be protected by a cathodic protection system designed to prevent corrosion. The cathodic protection system would be monitored regularly to ensure its effectiveness. In the event of a leak, the brine in the affected tank(s) would be drained to appropriate holding facilities (e.g. the existing brine pond or other tanks) or disposed of in an approved disposal well in order to prevent a spill.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 2. Prevention of Spills or Leaks

- Concerns were raised regarding leakage of materials from the salt caverns, pipeline ruptures, explosions, uncontrolled releases of explosive gases and emergency venting from pressurized lines and vessels.
- The Project will be designed to convey product and brine between the caverns, brine pond, and customer delivery points through closed piping systems (with the exception of the brine pond). The piping systems will be designed to all applicable codes and standards to minimize the potential for leaks. The piping systems will be designed to automatically isolate in the event that a leak is detected to minimize the potential volume of any release. The cavern wells will be situated on a well pad with a stormwater and runoff collection system that will be required to meet requirements set out by EPEA and Water Act approvals for the Project prior to release to land (i.e., chloride, pH, and sheen).

### Salt Caverns

- The potential for a spill, leak or uncontrolled release associated with the caverns is limited to causes at the wellhead or wellbore. Causes would consist of improper wellhead design, improper material selection, poor construction, corrosion, impact at the wellhead, or excessively high product flow rates. In the worst-case scenario, the result would be an uncontrolled release of product from the cavern escaping through the wellhead, otherwise known as a blowout. If the product ignited before the release could be contained, gaseous product would burn off in place. The product would be expected to burn for up to two weeks, depending on the amount of product in the cavern at the time. In the case of liquid product, if not ignited, it would pool on site and could contaminate soil, groundwater and the central wetland without the implementation of sufficient mitigation measures.
- There are approximately 160,000 active wells in Alberta. Uncontrolled releases from wells are rare. This is in large part due to enhanced regulatory measures related to prevention and safety that were developed in response to significant well events that occurred in Alberta in the 1980s, including the Lodgepole well blowout that occurred southwest of Edmonton in 1982.
- To prevent this:
  - Wellhead and cavern design will meet or exceed all regulations outlined in CSA Z341 Standard for the Storage of Hydrocarbons in Underground Formations in order to ensure proper design, development and maintenance of the caverns and their components are implemented. This will significantly decrease the risk of improper design.
  - Wellhead design and selection will follow standard industry engineering practice for design and material selection and will undergo industry standard inspections and testing to ensure quality standards are met
  - The Project will maintain material specifications, quality control program and an integrity program to monitor and prevent failures due to material and fabrication issues, and long-term degradation of materials.

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- Wellhead spacing is designed to minimize risk of an incident from a wellhead expanding to involve other wellheads or facilities
- Mechanical barriers around the wellheads will be put in place to reduce the risk of incidents caused by impact to the wellhead
- Access to the site will be restricted to trained site personnel and contractors only
- Secondary stormwater pond will be constructed as a barrier to the central wetland, and spill response procedures will be implemented to minimize any potential effect to Wetland W3 in the event of a spill at the wellhead
- The brine piping system will be protected from overpressure in the event of a wellbore brine string failure. Mechanical and instrumented safety systems will be designed to protect the piping systems and to minimize the risk of hydrocarbon product being released to the brine pond.
- A Hazard and Operability Analysis (HAZOP) will be performed on all piping systems (including the brine piping system) in order to systematically identify and address process and operational risks. The precautionary recommendations from the HAZOP pertaining to this case are expected to be Emergency Shut Down valves and controls for high pressure, high flow and low brine density.
- All operations staff responsible for cavern operations will be properly trained to perform their duties and will follow the ATCO internal Well Integrity Manual.

With the implementation of the identified controls and mitigation measures for design, construction, and operation, the probability of a spill or leak at the wellheads is very low.

## Pipelines

- The potential for a spill or leak from a pipeline is related to improper design or material selection, corrosion, poor construction or physical damage by line strikes. A spill or leak from a pipeline related to the proposed Project could result in potential release of flammable liquid or gas. If the hydrocarbon product is ignited, this could result in an explosion and fire while the product burns off. In the case of liquid product, if it is not ignited it will pool and could cause soil, wetland or groundwater contamination.

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- To prevent this:
  - Pipeline design will meet or exceed all requirements in the *Pipeline Act* and *Pipeline Rules*, as well as CSA Z662: Oil & Gas Pipeline System Standard and B31.3 Process Piping, as applicable, in order to ensure proper design, construction and maintenance of the pipeline and its components are implemented. This will significantly decrease the risk of improper design.
  - During detailed design, a HAZOP will be performed on all piping systems (including the pipelines) in order to systematically identify and address risks. The recommendations from the HAZOP pertaining to this case are expected to be Emergency Shut Down valves, and leak detection which would limit the volume of any product released in event of a failure.
  - Quality inspection and monitoring programs will be in place during the construction and maintenance of the pipeline to ensure long term integrity of the system.
  - The pipelines will be included in AES' Pipeline Integrity management program, required by the Pipeline Act, Pipeline Rules (Regulation) and CSA Z662. This includes that cathodic protection be implemented for underground pipelines in order to mitigate corrosion risk and that pipelines are monitored and inspected on a regular basis to ensure continued safe operation and compliance. This will significantly decrease the risk of corrosion.
  - Pipelines extending outside of the Project Site will be licensed with the AER and will be contained within a right of way owned by AES. Pursuant to applicable regulations, any other entity performing work in proximity to this pipeline will need to notify and obtain approval from ATCO and undergo standard ground disturbance protocols. This will limit the access of personnel to the pipeline and ensure proper procedures are undertaken to prevent mechanical damage from equipment.

With the implementation of the identified controls and mitigation measures for design, construction, and operation, the probability of a spill or leak or a pipeline is very low.

## Product Handling Facility

- Spill or leaks within the product handling facility could arise as a result of a piping system or equipment failure. A spill or leak from piping or equipment related to the proposed Project could result in potential release of flammable liquid or gas. If the hydrocarbon product is ignited, this could result in an explosion and fire while the product burns off. In the case of liquid product, if it is not ignited it will pool and could cause soil, wetland or groundwater contamination without the implementation of sufficient mitigation measures.

To prevent this:

- The safety of the facility will be considered throughout the lifecycle of the Project, from design through to construction, operations and maintenance. The Project facilities will be designed by licensed and experienced engineers in accordance with all applicable codes and standards.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

- Piping design will follow ASME B31.3 Code for Process Pressure Piping and internal AES piping specifications. Any deviations from these codes and specifications will be documented and signed off by a registered engineering professional.
- All process equipment will be selected, sized and specified for the process design conditions to ensure proper and safe operation of the facility can be performed and will be subject to registration approval with the Alberta Boiler Safety Association (ABSA).
- Quality inspection and monitoring programs will be in place during the construction and maintenance of the process piping and vessels to ensure long term integrity of the system. Vessel inspections will be completed in accordance to ABSA regulations. Integrity inspection and management for all process piping, pressure vessels and equipment will be managed in accordance with AES' Pressure Equipment Integrity Management program.
- The operation of the facilities will be monitored 24 hours per day, 7 days per week by a plant control system overseen by qualified operations staff (power engineers). The facility will be supervised by a Chief Power Engineer and each shift has oversight by a qualified shift engineer.

With the implementation of the identified controls and mitigation measures for design, construction, and operation, the probability of a spill or leak at the product handling facility is very low.

## **Emergency venting from pressurized lines and vessels**

No emergency venting from pressurized lines and vessels is expected. All hydrocarbon service pressure vessels and piping will be protected through design and material selection or by pressure safety valves that will release product to the flare system in the event of a process upset or emergency.

## **Prevention of Spill or Leaks during Construction**

- During construction of the Project facilities, spills or releases to the environment could occur as a result of improper fuel storage, improper activities to refuel stationary and mobile equipment, leaks or spills of engine oil or hydraulic fluids during use, or release of drilling fluid during drilling activities. These could result in contamination of soils around the specific equipment in use, or on the Project Site.
- To prevent these spills and leaks, AES will develop, or require that its contractors develop and adhere to:
  - Fuel management plans
  - Equipment maintenance programs
  - Standard procedures and equipment to comply with regulatory requirements for use of specific equipment

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- Limits on use of specific equipment within specific areas of the Project Site
- All requirements of ESC and other plans and requirements for setbacks to specific Project Site features

## 3. Preparation for Natural Disasters & Other Potential Events

- In addition to the potential asset-specific accidents or malfunctions described above, additional design, construction and operational mitigation measures would be put in place for the proposed Project to reduce or limit any effect from natural disasters or other potential unintentional acts. These include tornados, earthquakes, vandalism, sabotage, severe flooding of wetland W3, lightning strike and loss of power.
- These events could arise from extreme weather or seismic events, wilful and illegal misconduct, an incident on the local utility power network (extreme weather, equipment failure, damage or blackouts) or other external events causing a power system interruption.
- Effects of natural disasters caused by extreme weather or seismic events include potential damage to surface facilities including piping, vessels, power, controls, buildings, and the brine pond. The following mitigation measures will support the prevention of any effects of these events:
  - The proposed Project will be designed for typical local environmental conditions, including 100 year flooding events and seismic conditions.
  - All processes will be equipped with safety systems to safely shut down the facility in emergency situations.
  - The facility is designed to shut down safely on loss of power with uninterruptible power supplies for control and safety systems
  - Emergency shut down valves are designed with a fail-safe position in the case of loss of power or pneumatic control systems. This is designed for safe shutdowns of the system even in a case where the control system fails or is compromised.
  - In critical parts of the process, the control system is equipped with redundant controllers, which protects the facility from unexpected controller failures. The controllers are designed and installed to minimize the risk of damage due to lightning strikes. The standby controllers are continuously in service to maintain control and process runtime in the event of hardware failures.
  - Cavern wellheads are equipped with Emergency Shutdown Valves which would close in the event of a subsurface wellbore failure.

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- A Stormwater Management Plan (SWMP) is in place in order to properly monitor all water runoff from the facility area for contamination before pumping into the central wetland. As a part of this overall SWMP, a new stormwater pond will be constructed for the new product handling facility and wellsite areas to control rate of water influx to the central wetland W3. A plan will be in place to actively control the water level in the wetland when required by pumping water to AES' industrial water system offsetting water intake from the North Saskatchewan River.
- Access from public roads is controlled by operations and gate access
- Security alarms and cameras are in place and will be added as part of the proposed Project at key locations
- This site has a security system which is regularly monitored by facility personnel, and standard security measures including fencing, locked doors and gates have been implemented

## 6.2 Emergency Preparedness and Response

AES has an existing Fort Saskatchewan Emergency Response Plan (ERP) approved by the AER under Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry (AER 2017). The Fort Saskatchewan ERP was prepared in accordance with the requirements of the Incident Command System (ICS). This ERP will be updated as part of AER approval requirements for each of the Cavern Storage Scheme Approvals (including wells) and the Water Act (Dam Safety) Approval. AES will also be required to update its existing Site-specific ERP for the pipelines to comply with the Pipeline Rules and Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry (AER 2017). The ERP will also comply with the requirements of CSA Z662: Oil and Gas pipeline systems. The required ERPs will apply to site preparation and operation of the applicable components of the Project.

For the Cavern Storage Scheme Approval, dispersion modelling will be conducted to determine the extent of the Emergency Planning Zone (EPZ). This modelling will be completed prior to the start of cavern mining. The EPZ for the existing Strathcona Salt Cavern Storage Facility is 820 metres from the centre of the ethylene wellhead at the existing facility. The EPZ is expected to be expanded to the south of the existing facility to encompass the new surface facilities and well sites, which are expected to be located at the southern portion of SW 34-55-21 W4M.

- In the very unlikely event that a brine pond breach occurred without any warning from ongoing monitoring and surveillance, the AER approved Emergency Response Plan (ERP) specific to the brine pond would be implemented, as per Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry (AER 2017) and Section 7.1 of the Dam and Canal Safety Directive (AER 2018). This ERP is required to be in place and approved by the AER prior to initial operation. As part of this approval, a detailed inundation study will be prepared in accordance with Section 3.2 of the Dam and Canal Safety Directive (AER 2018) which will determine the consequence classification and identify potential extents of emergency response required. As discussed above, mechanisms to dispose of brine prior to minimize the extent of a release would be employed immediately and are expected to minimize the extent of any effect.

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The ERPs required for the Project will be designed to minimize duplication of effort and prevent loss of time by providing operations personnel with information and duties that define a clear chain of the command and responsibilities. The primary goals of an ERP are to:

- Safeguard life
- Manage and control the emergency
- Limit adverse environmental impacts
- Prevent or minimize escalation of the event until additional resources arrive
- Render the affected site safe post-incident

AES has adequate resources for responding to emergency events including:

- Personnel on site trained in specific response measures and Incident Command System ICS 100 or greater.
- On-site standby emergency facilities and equipment for use by trained personnel (e.g., secondary containment, fire fighting equipment)
- Membership in Mutual Aid organizations such as Northeast Region CAER (NRCAER)
- Access to spill response preparedness support and equipment through the Western Canadian Spill Services Co-op, and
- Additional third-party resource (e.g., RCMP, fire department, Strathcona County) who may be engaged as required

A trained and qualified Incident Command Team will respond to any incidents. Environmental remediation plans would be established specific to the event. Training and exercises are and will continue to be held annually to support preparedness to potential emergencies and to ensure that members of the emergency response team and operations staff are aware of and understand their roles and duties in relation to the plan. ERP Exercises will also be held in accordance with Section 7.4 of the Dam and Canal Safety Directive (AER 2018) to ensure effectiveness of the approved ERP.

AES will also prepare a Construction Site Fire Safety Plan in accordance with the requirements of Strathcona County (Strathcona County 2021).



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 6.2.1 Mutual Aid

AES is a member of NRCAER, which is a mutual aid emergency response association that was formed in 1991. Members include emergency management professionals, pipeline companies, chemical transporters, and area municipalities. NRCAER trains, plans and shares best practices for emergency response in a 700 square-kilometre area around the Alberta Industrial Heartland (NR CAER 2018). AES participates in various meetings, training and call down exercises as a member. AES also has an online radwetlandsio link located in its control room at the existing facility.

Northeast Region CAER is activated when mutual aid is requested. Coordinated through Strathcona County 911 dispatch, members are contacted to dispatch available resources. Utilizing a unified command structure, equipment and personnel are brought into the response (NR CAER 2018).

Each member has a site-specific emergency response plan that expands to include working with their local municipal fire department and mutual aid partners through NRCAER. This includes:

- Site Response, when response is managed by the site response team
- Site + Municipality Response, when response is managed by the site response team and their local fire department
- Mutual Aid Response, when additional resources are requested by the local municipal authority (NR CAER 2018)

## 6.3 Spill Prevention and Response

AES focuses on preventing spills through design criteria, preventative maintenance, and operating procedures. Design and engineering controls to prevent and control spills are discussed in Section 6.1. With these measures in place, there is still a low risk of spills or releases to occur. The spill response prevention and response plans in place for the existing Project Site will be extended to include the expansion Project and any new mitigation measures will be taken to eliminate or minimize the potential for liquid spills.

### 6.3.1 Spill Prevention

In addition to the design and engineering controls described in Section 6.1, AES employees will be trained in accordance with AES' internal requirements for spill prevention and response. Spill prevention and response training will also be a requirement for contractors working at the Project Site. All AES employees are required to complete WHMIS 2015 training and employees working on the Project Site will be required to complete site-specific WHMIS training to ensure proper handling and storage of chemicals and support spill prevention.

Critical steps to minimizing the potential for spills or releases include assessing the risks, setting controls, and developing a response plan. AES has formal management system procedures in place to ensure the risk of leaks, releases, spills and other environmental effects (as well as safety risks and emergency events) have been identified and that mitigation measures have been identified and implemented. These risk assessments are developed for all new facilities and are reviewed at least every three years for continual improvement. Asset-specific hazards are identified during asset-specific training required for all site operations personnel.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Employees and contractors will also be trained on administrative controls including:

- **Storage instructions:** Substances used for construction and operations will be stored in areas away from catch basins, floor drains, or outside established boundaries surrounding wetlands and water bodies.
- **Management practices:** Loading and unloading of substances will be completed with appropriate supervision to identify potential leaks and reduce risks to human safety through accidents and malfunctions related to loading/unloading. AES will ensure that contractors develop and adhere to fuel management plans for their activities and that mitigating measures are in place to minimize the risk of a spill occurring.
- **Physical barriers:** Drip trays will be placed beneath on- and off-road equipment when fueling, within a 30 m boundary of a wetland or water body (i.e., during construction of the pipeline ROW), and where the risk of leaks or spills has determined additional administrative controls are required. Drip trays will be used for any fueling activities from portable containers. AES will ensure that contractors provide properly maintained equipment and have procedures and mitigations plans in place to minimize the risk and impact of a spill.
- **Waste oil and hydrocarbon storage:** On site hydrocarbon storage containers and capacities will be inventoried and marked on facility maps. Storage of waste oil and other substances will comply with the requirements of Directive 055: Storage Requirements for the Upstream Petroleum Industry (AER 2001) and the AEP Alberta User Guide for Waste Managers (AEP 1996).

## 6.3.2 Spill Response

The existing Fort Saskatchewan ERP includes a spill response procedure which complies with the applicable guidelines and requirements of AER, Alberta Environment and Parks (AEP) and federal and municipal agencies. The spill response plan is a fulsome plan including procedures to advise regulatory bodies within specific timeframes and to communicate with the public regarding releases, as well as to respond and clean up the spill and, where needed, remediate the affected area. In the event of a spill, all operations personnel know how to respond quickly and effectively to control, contain, and clean up the spill.

Waste materials that would result from a spill or release (e.g., contaminated soil, absorbent booms) would be handled, stored, and treated in accordance with applicable regulatory requirements. If a spill or release could reach surface water, AES would install appropriate ESC measures and take measures to limit or slow release into receiving water bodies.

AES and contractor personnel expected to respond to a spill response will be trained in and have a working knowledge of the applicable spill contingency plan. Regular training in emergency response and spill procedures is carried out to ensure personnel safety, fire prevention, and spill response in the event of an incident.

Any spills and releases are reported internally, regardless of volume. Releases that reach surface or groundwater or that are otherwise reportable to regulatory agencies would be reported as required. Any releases would be investigated following AES' Incident Management process to identify root causes and guide implementation of control measures to reduce the risk of reoccurrence. An Environmental Remediation plan would be established specific to the event, as applicable.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

AES is a member of the Western Canadian Spill Services Co-op whose mandate is to ensure the provision of cost-effective, integrated, emergency response support, including planning and preparedness training, for spill preparedness and environmental protection.

## 6.4 Fire Prevention and Control Plan

Fire prevention will be part of facility and infrastructure design, construction and operation. Preventive measures during design and construction are discussed in Section 6.1. Additional design and operating measures to protect the facility include:

- Facilities are designed in accordance with the National Fire Code
- Electrical equipment is designed for the appropriate hazardous area classification
- Fire response will be considered when designing location of facilities on the site
- A Fire Risk study will be completed as required by Strathcona County for the Development Permit application.
- Buildings and process areas will be equipped with fire and smoke detection systems as appropriate which would shut down and de-pressure the facilities to minimize the risk of fire
- Vegetation management will include ongoing monitoring and assessment; nuisance vegetation that presents a hazard will be removed
- Hot work during construction and operation will be undertaken in compliance with all Fire Code and OHS Code requirements
- Activities that involve working with materials that may generate combustible dust will be managed through approved dust control practices.
- Storage and management of waste, chemicals, and combustibles will comply with applicable regulations
- Fire and smoke detection equipment and extinguishing equipment will be installed throughout the surface facilities at the Project Site in accordance with the requirements of Strathcona County.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 7.0 CLIMATE CHANGE RESILIENCY (EFFECTS OF THE ENVIRONMENT ON THE PROJECT)

The effects of climate change on the proposed Project have been considered during Project planning and design and will continue to be considered during detailed design. The proposed Project is anticipated to be operational in 2024 with a 25-year lifespan ending in 2049. While it is difficult to forecast precise environmental changes, general climate change projections include warmer climate and more severe weather including variances in precipitation and wind patterns.

In addition to the potential for accidents and malfunctions discussed in Section 6 related to natural disasters and power loss, the following effects have been evaluated and mitigation measures discussed:

- Variances in precipitation could affect potential environmental effects to the proposed Project. Heavy rain could increase flood risks and a sudden precipitation event could increase water volumes on the Project Site and an increase in the volume of water and sedimentation received in Wetland W3 and other water bodies surrounding the site. AES has existing Storm and Groundwater Management Plans that will be amended to reflect drainage and catchment modifications made to the site in support of the proposed Project. A pumping system is planned to be installed to control the level of wetland W3 to its normal water level to maximize the storage capacity of the wetland available to contain runoff water from a severe precipitation event. Managing the wetland water level, as per existing Approvals to be amended and as per new Approvals required, before and after an extreme precipitation event would minimize the probability of overland discharge from wetland W3 to the surrounding wetlands.
- The brine pond will be open to the environment and will collect precipitation. The maximum brine level in the pond is typically maintained approximately 1 metre down from the top of the containment liner to ensure capacity is retained to manage precipitation events. If required, the level in the brine pond can be lowered by pumping surplus brine to the disposal wells.
- Effects of climate change may result in power outages to the facility. The facility will be designed to safely shut down in the event of power outages. The control system will be equipped with Uninterruptible Power Supplies that will allow the plant to shut down in a controlled manner in the event of power outages.

There are minimal GHG emissions associated with the proposed Project and these emissions are unlikely to contribute materially to climate change. AES will continue to evaluate options to reduce the Project's GHG emissions. GHG emissions associated with the Project are discussed in Sections 6 and 23 of the DPD, Appendix C of the DPD and Table 6 of this document.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## 8.0 SUMMARY AND CONCLUSIONS

This SA has intended to qualify and evaluate the potential environmental, health, social and economic effects, and impacts on Indigenous peoples and rights of Indigenous peoples that may result from the proposed Project and demonstrate associated mitigations.

The Project is proposed to be located on an existing industrial site on lands that are owned by AES. The local area is zoned for heavy industrial use, and the Project lands and surrounding lands are privately owned and generally cultivated or developed.

As set out above, AES undertook a qualitative assessment of potential effects of the Project on VCs identified in the Information Regulations and as being of concern to stakeholders. Using conservative assumptions, the SA demonstrates that with the application of technically and economically practicable mitigation measures, the Project is unlikely to result in consequential adverse residual effects (i.e., no residual effect or minor residual effect) to the environment, or health, social or economic conditions. In particular, the Project is unlikely to result in effects to fish and fish habitat, aquatic species, migratory birds, or to Indigenous peoples, their current traditional land and resource use, physical and cultural heritage, or their rights. The low levels of GHG emissions from the Project are not expected to contribute materially to climate change.

Risks of accidents and malfunctions associated with the Project, including spills and emergency scenarios, are minimized through design, management and preparedness measures, as well as existing legislative and regulatory controls. The Project has been designed to withstand expected environmental effects associated with climate change that could lead to accidents and malfunctions.

Effects of the Project will be monitored and managed in accordance with existing regulatory mechanisms under applicable provincial legislation and the terms and conditions of regulatory approvals. In the event that effects associated with the Project are greater than anticipated or result in exceedances of any applicable environmental thresholds, there are further existing regulatory management systems and mechanisms in place that would apply, including the potential for compliance and enforcement measures to be taken by provincial and municipal regulators.

AES is committed to continuing engagement with local residents, landowners and occupants, Indigenous Communities, regulatory authorities, and other interested stakeholders throughout the life cycle of the Project and will actively respond to and attempt to address any issues or concerns raised.

# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

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## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

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# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## APPENDIX C – ATCO SALT CAVERN STORAGE EXPANSION PROJECT GREENHOUSE GAS TECHNICAL DATA REPORT





**ATCO Salt Cavern Storage  
Expansion Project**

Greenhouse Gas Technical Data Report

Final

March 29, 2021

Prepared for:

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# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

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## Abbreviations

AEP	Alberta Environment and Parks
AES	ATCO Energy Solutions Ltd.
AHEC	ATCO Heartland Energy Centre
AIH	Alberta Industrial Heartland
AQM	Alberta Greenhouse Gas Quantification Methodologies
bbbl	barrel
BC	British Columbia
C	carbon
C3	propane
C3+	propane plus
C5	pentane
C5+	Pentane plus
CER	Canada Energy Regulator
CH <sub>4</sub>	methane
CO <sub>2</sub>	carbon dioxide
CO <sub>2e</sub>	carbon dioxide equivalent



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

d	day
e <sup>3</sup> m <sup>3</sup>	thousand cubic meters
ECCC	Environment and Climate Change Canada
Existing Facility	Existing Strathcona Salt Cavern Storage Facility
g	gram
GC	Gas Chromatograph
GHG	greenhouse gas
GJ	gigajoule
GWP	global warming potential
ha	hectare
HDD	Horizontal Directional Drilling
HFCs	hydrofluorocarbons
HHV	higher heating value
hr	hour
IAA	Impact Assessment Act
IAAC	Impact Assessment Agency of Canada
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram



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kL	kiloliter
km	kilometer
kt	kilotonnes
KWh	kilowatt-hour
L	liter
m <sup>3</sup>	cubic meter
M	Meridian
MMcf	One million cubic feet
MWh	Megawatt-hour
N <sub>2</sub> O	nitrous oxide
NF <sub>3</sub>	nitrogen trifluoride
NGL	natural gas liquids
NIR	National Inventory Report
NRCAN	Natural Resources Canada
NW	Northwest
PD	Project Description
PFCs	perfluorocarbons
Project	ATCO Salt Cavern Storage Expansion Project



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

QM	Quantification Methodology or Quantification Methods
SACC	Strategic Assessment of Climate Change
Stantec	Stantec Consulting Ltd.
SF <sub>6</sub>	sulphur hexafluoride
SW	Southwest
t	tonnes
TDR	Technical Data Report
W	West
WCI	Western Climate Initiative



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Introduction  
March 29, 2021

## 1.0 INTRODUCTION

ATCO Energy Solutions Ltd. (AES) is planning to expand their existing Strathcona Salt Cavern Storage Facility (the Existing Facility) capacity with four additional 100,000 m<sup>3</sup> salt caverns to store natural gas liquids (NGL) and their associated surface facilities including a product handling facility and a brine pond. The proposed project is called the ATCO Salt Cavern Storage Expansion Project (Project). Stantec Consulting Ltd. (Stantec) was retained by AES to complete a quantitative assessment of the greenhouse gas (GHG) emissions from this Project to support AES Detailed Project Description (PD) to the Impact Assessment Agency of Canada (IAAC). This technical data report (TDR) has been prepared to detail the GHG emission calculations for the Project.

The Project will be located approximately 14 km northeast of the City of Fort Saskatchewan and approximately 30 km northeast of the City of Edmonton, within Strathcona County, Alberta. The Project will be located within the existing SW 34-55-21-W4M site and potentially extend onto NW 27-55-21-W4M and Lot 'D' of NW 34-55-21-W4M, all private land owned by AES within the Alberta Industrial Heartland (AIH) near Fort Saskatchewan, Alberta. The Existing Facility has four NGL storage caverns each with a capacity of 100,000 m<sup>3</sup> and has a footprint of approximately 24 hectares (ha). The Project would add approximately 30 ha of additional development.

The Strategic Assessment of Climate Change (SACC) complements the other policy and guidance documents that support the impact assessment process. SACC is applicable to designated projects under the Impact Assessment Act (IAA) and for projects regulated by the Canada Energy Regulator (CER) (Government of Canada 2020). A key factor for consideration in the SACC is the extent to which the effects of a project contribute or hinder the Government of Canada's ability to meet its climate change commitments.

The SACC requires quantification of GHG emissions from a project, assessment of upstream emissions if upstream emissions exceed 500 kt CO<sub>2</sub>e (with a declining threshold in future years), and development of a credible plan to achieve net-zero emissions by 2050. This TDR presents technical details related to GHG emissions from the Project and the Project's upstream emissions. The information has been generated from existing literature, published technical data sources, engineering calculations, and from the Project engineers. The following information is presented within this report:

The following information is presented within this report:

- Substances of interest, i.e., the specific GHGs from this Project (Section 2)
- Description of the methods for estimating the quantities of GHGs (Section 3.0)
- Summary of estimated GHG emissions by Project phase, including construction (Section 4.1) and operation (Section 4.2), as well as third-party emissions (Section 4.3) and an upstream GHG screening assessment (Section 4.4)
- Conclusions (Section 5.0).





## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Substances of Interest

March 29, 2021

### 2.0 SUBSTANCES OF INTEREST

A GHG can be any atmospheric gas that absorbs and re-emits infrared radiation, thereby acting as a thermal blanket for the planet that warms the lower levels of the atmosphere. The GHGs are released to the atmosphere from both natural and anthropogenic (human activity) sources (IPCC 2013).

Greenhouse gases are tracked provincially and federally and are reported annually in the National Inventory Report (NIR) (ECCC 2020). The national GHG inventory includes the following gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF<sub>6</sub>), and nitrogen trifluoride (NF<sub>3</sub>) (ECCC 2020).

For this TDR, the GHGs that may be released during Project activities are CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O and are included in this assessment. The GHGs that are not expected to be emitted by the Project are PFC, HFC, SF<sub>6</sub>, and NF<sub>3</sub> as these are not used or present in any activities and are therefore excluded from further consideration in this assessment.

Emissions of each of the included GHGs are multiplied by their 100-year global warming potential (GWP) and are reported as carbon dioxide equivalent (CO<sub>2</sub>e). The GWP of these GHGs are from Environment and Climate Change Canada (ECCC) and align with the ones applied in the NIR (ECCC 2019, 2020):

- CO<sub>2</sub> = 1
- CH<sub>4</sub> = 25
- N<sub>2</sub>O = 298

The total mass of carbon dioxide equivalent (CO<sub>2</sub>e) for the Project is calculated as:

$$CO_2e = (mass\ CO_2 * 1) + (mass\ CH_4 * 25) + (mass\ N_2O * 298)$$



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Greenhouse Gas Calculation Methods

March 29, 2021

### 3.0 GREENHOUSE GAS CALCULATION METHODS

The methods used to estimate the GHG emissions from the Project are based on accounting and reporting principles of the GHG Protocol developed by the World Resource Institute and the World Business Council for Sustainable Development (2015). The GHG Protocol is an internationally accepted accounting and reporting standard for quantifying and reporting GHG emissions. The guiding principles of the Protocol are relevance, completeness, consistency, transparency, and accuracy. In the few cases where uncertainty is high, conservative assumptions were applied, and this is expected to provide a small overestimate of the GHG emissions (WCI 2011, 2013).

The Project will be constructed on an existing industrial land but there will be a small change in land use from vegetation to industrial land for soil stockpile. Emissions associated with activities for land-use change were included in the assessment. The GHG emissions that will be released as a result of the construction and operation of the Project have been calculated. These include emissions released during construction as a result of vehicle/equipment uses and land-use change and those released during operation as a result of flaring and fugitive emissions. During the construction and operation phases, the Project consumes imported electricity. The indirect emissions associated with imported electricity consumption are also included in the assessment. Methods described in the following sections are expected to yield conservative results as they are based on engineering estimates. The project does not capture and store CO<sub>2</sub> and there are no avoided emissions as a result of this Project. Finally, the upstream emissions associated with the Project were calculated.

The sections below describe the methods for estimating GHGs from each emission source and for each phase of the Project: construction, operation, and upstream.

#### 3.1 CONSTRUCTION PHASE

##### 3.1.1 Off-Road Construction Equipment

Off-road equipment and vehicles used for the construction of the Project include diesel-fuelled heavy-duty equipment such as drilling rig, tractor, crawler, excavator, scraper, backhoes, articulated truck, graders, dozers, compactors, horizontal directional drilling (HDD) rig as well as cranes. Off-road equipment and vehicles are not typically allowed on highways or public roads. The diesel fuel consumption for off-road equipment and vehicles was estimated and provided by AES. The off-road engines for this assessment are assumed to be larger than 19 kW and are compliant with the ECCC Tier 4 emission standards. The off-road construction equipment list and their fuel consumption are provided in Table 3-1.



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Greenhouse Gas Calculation Methods  
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**Table 3-1 Off-Road Construction Equipment**

Emission Source	Fuel Type	Fuel Consumption (L)
Caterpillar D6N Crawler Tractor	Diesel	111,408.00
Caterpillar PL87 Crawler Pipe Layer	Diesel	50,256.00
Caterpillar 12M Motor Grader	Diesel	40,936.00
Caterpillar 336E H Hydraulic Excavator	Diesel	215,250.00
Caterpillar 631G Motor Scraper	Diesel	19,400.00
Caterpillar 430D Loader Backhoe	Diesel	12,768.00
Caterpillar 735 Articulated Dump Truck	Diesel	286,350.00
Caterpillar 814F Wheel Dozer	Diesel	24,000.00
Caterpillar 825H Compactor	Diesel	8,364.00
HDD Maxi Rig	Diesel	33,118.75
Crane	Diesel	24,000.00
Drilling Rig	Diesel	1,200,000.00
SOURCE: Provided by AES		

Emissions are calculated as:

$$Emission \text{ (tonnes)} = Fuel \text{ Consumption (L)} * Unit \text{ Conversion } \left( \frac{kL}{10^3 L} \right) * Emission \text{ Factor } \left( \frac{t}{kL} \right)$$

Emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O are from the Alberta Greenhouse Gas Quantification Methodologies (AQM, AEP 2020). These emission factors are used to convert fuel consumption totals to GHG emissions. The emission factors used for this activity are summarized in Table 3-2.

**Table 3-2 Emission Factors for Off-Road Engines**

Emission Source	Emission Factor (t/kL Fuel)		
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
Off-Road – Diesel ≥19 kW (Tier 4)	2.68	7.30E-05	2.30E-04
SOURCE: AQM Table 1-1 and Table 5-1 (AEP 2020).			



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Greenhouse Gas Calculation Methods  
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### 3.1.2 On-Road Construction Equipment

On-road construction equipment and vehicles used for the construction of the Project include diesel-fuelled equipment such as pick-up trucks, crew cabs, welder trucks, gravel trucks, fuel trucks, hydro-vac trucks, and freight trucks. On-road vehicles and equipment are typically approved to travel on highways and public roads. The diesel fuel consumption for on-road equipment and vehicles was estimated and provided by AES. On-road engines for this assessment are assumed to be heavy-duty with advanced emission control technology to be conservative. The on-road construction equipment list and their fuel consumption are provided in Table 3-3.

**Table 3-3 On-Road Construction Equipment**

Emission Source	Fuel Type	Fuel Consumption (L)
Ford Ranger Pickup	Diesel	19,986.40
Ford F-150 Crew Cab	Diesel	23,983.68
Welder Truck	Diesel	8,928.00
Gravel Truck	Diesel	237.00
Fuel Truck	Diesel	5,996.10
Hydrovac Truck	Diesel	13,392.00
Freight Truck	Diesel	5,498.40
SOURCE: Provided by AES		

Emissions are calculated as:

$$\text{Emission (tonnes)} = \text{Fuel Consumption (L)} * \text{Unit Conversion} \left( \frac{\text{kL}}{10^3 \text{L}} \right) * \text{Emission Factor} \left( \frac{\text{t}}{\text{kL}} \right)$$

Emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O are from the AQM (AEP 2020). These emission factors are used to convert fuel consumption totals to GHG emissions. The emission factors used for this activity are summarized in Table 3-4.

**Table 3-4 Emission Factors for On-Road Engines**

Emissions Source	Emission Factor (t/kL Fuel)		
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
On-Road Heavy-Duty Diesel Vehicles (advanced control)	2.68	1.10E-04	1.50E-04
SOURCE: AQM Table 1-1 and Table 5-1 (AEP 2020).			

### 3.1.3 Other Construction Equipment

Other construction equipment used for the construction of the Project include propane fuelled heaters as well as diesel fuelled light towers. The fuel consumption for these equipment were estimated and provided by AES. The fuel consumption associated with these equipment is provided in Table 3-5.



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**Table 3-5 Other Construction Equipment**

Emission Source	Fuel Type	Fuel Consumption (L)
Heaters	Propane	47,565.49
Light Towers	Diesel	79,380.00
SOURCE: Provided by AES		

Emissions are calculated as:

$$Emission \text{ (tonnes)} = Fuel \text{ Consumption (L)} * Unit \text{ Conversion } \left( \frac{kL}{10^3L} \right) * Emission \text{ Factor } \left( \frac{t}{kL} \right)$$

Emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O are from the AQM (AEP 2020). These emission factors are used to convert fuel consumption totals to GHG emissions. The emission factors used for this activity are summarized in Table 3-6

**Table 3-6 Emission Factors for Other Equipment**

Emission Source	Emission Factor (t/kL Fuel)		
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
Heaters (Propane fuelled)	1.52	2.40E-05	1.08E-04
Light Towers (Diesel fuelled)	2.68	7.80E-05	2.00E-05
SOURCE: AQM Table 1-1 (AEP 2020).			

### 3.1.4 Land Clearing, Burning and Decay

The area of land clearing for the construction of the Project is provided by AES and shown in Table 3-7. Of the 5 ha of total cleared area, approximately 80% (i.e., 4 ha) is trees and shrubs and the remaining 20% (i.e., 1 ha) is grassland. This land will be cleared to accommodate soil stockpiling associated with construction of the Project.

**Table 3-7 Land Clearing Area**

Emission Source	Area (ha)
Land Clearing	5
SOURCE: Provided by AES	

Emissions related to land clearing and biomass decay are estimated using the following equation:

$$Emissions \text{ (t CO}_2\text{e)} = Area \text{ Cleared (ha)} \times Emission \text{ Factor of Eco - region } \left( \frac{t \text{ CO}_2\text{e emitted}}{ha} \right).$$

To estimate CO<sub>2</sub>e emissions related to land clearing, burning and decay, factors from the Ministry of Forests, Land and Natural Resources (Dymond 2014) spreadsheet are identified based on ecoregion and salvaging practices. It is assumed that all biomass (including debris, stumps, and unused portions of the salvaged timber) is to be burned. It is a conservative approach as AES does not plan to burn the harvested material. The emission factor for Mid-North Coast were assumed to be appropriate for the



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Greenhouse Gas Calculation Methods  
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Project location in AB as they are the most conservative factors that could be utilized from BC's database of ecoregion-specific emission factors. The average emission factors shown in Table 3-8 are applied.

**Table 3-8 Emission Factors for Land Clearing**

Emission Source	Emission Factor (tCO <sub>2</sub> e/ha)
Land clearing, burning and decay	925.09
SOURCE: Dymond 2014	

## 3.2 OPERATION PHASE

### 3.2.1 Flaring Emissions

The Project is equipped with a flare system to dispose of small amount of hydrocarbon from the brine gas and also to dispose of gas during upset conditions. In addition to this, the Project may have one gas chromatograph (GC) which vents gas and this GC vent gas will be diverted to the flare stack.

For this assessment, the flare pilot and purge gas as well as the GC vent gas are conservatively assumed to be operating throughout the year as a worst-case scenario. The estimated amount of flare gas volume for each scenario except GC vent gas and their respective gas composition was provided by AES. GC vent gas volumes were estimated based on the AQM generic vent rate (AEP 2020). AES stated that the GC vent gas will be mainly propane or butane. For this assessment, we conservatively assumed that the GC vent gas is 100% butane. A default combustion efficiency of 98% was used for this assessment (WCI 2011). The flare gas volume for each scenario and their gas compositions are summarized in Table 3-9.

**Table 3-9 Flare Gas Volume and Compositions**

Unit Name/Description		Flare - Pilot and Purge Gas	PSV lift	Brine Flare	GC Vent Gas
Event (Normal/Upset)		Normal	Upset	Normal	Normal
Frequency		Continuous	six times a year	daily	Continuous
Duration		-	1 day	hour	-
Flow Rate	e <sup>3</sup> m <sup>3</sup> /d	1.5	2	0.05	0.002 <sup>a</sup>
Flare Volume	e <sup>3</sup> m <sup>3</sup> /year	547.50	12.00	18.25	0.84 <sup>a</sup>
Hydrogen	Mole Fraction	0.00	0.00	0.00	0.00
Helium		0.00	0.00	0.00	0.00
Nitrogen		0.00	0.00	0.00	0.00
Carbon dioxide		0.00	0.00	0.00	0.00
Hydrogen Sulphide		0.00	0.00	0.00	0.00
Methane		0.95	0.05	0.00	0.00
Ethane		0.00	0.00	0.00	0.00
Propane		0.03	0.48	0.50	0.00



# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

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**Table 3-9 Flare Gas Volume and Compositions**

Unit Name/Description		Flare - Pilot and Purge Gas	PSV lift	Brine Flare	GC Vent Gas
Isobutane		0.03	0.48	0.50	1.00
n-butane		0.00	0.00	0.00	0.00
Isopentane		0.00	0.00	0.00	0.00
n-pentane		0.00	0.00	0.00	0.00
Hexane		0.00	0.00	0.00	0.00
Heptane		0.00	0.00	0.00	0.00
Octane Plus		0.00	0.00	0.00	0.00
<b>Total</b>		<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>
NOTE:					
<sup>a</sup> Estimated using the AQM generic vent rate (AEP 2020)					
SOURCE: Provided by AES					

Emissions are calculated as:

*Combusted CO<sub>2</sub> Emission (tonnes/year)*

$$= \text{Flare Volume (e}^3\text{m}^3\text{/year)} * \text{Mole Fraction of flare gas excluding CO}_2$$

$$* \text{carbon number for hydrocarbon compounds in flare gas} * \text{Combustion Efficiency} * \text{CO}_2 \text{ Density (1.861 } \frac{\text{kg}}{\text{m}^3}\text{)}$$

$$* \text{Unit Conversion (} \frac{\text{tonnes}}{10^3\text{kg}}\text{)}$$

*Non – Combusted CO<sub>2</sub> Emission (tonnes/year)*

$$= \text{Flare Volume (e}^3\text{m}^3\text{/year)} * \text{CO}_2 \text{ Mole Fraction of flare gas} * \text{carbon number of CO}_2$$

$$* \text{CO}_2 \text{ Density (1.861 } \frac{\text{kg}}{\text{m}^3}\text{)} * \text{Unit Conversion (} \frac{\text{tonnes}}{10^3\text{kg}}\text{)}$$

*Total CO<sub>2</sub> Emission (tonnes/year) = Combusted CO<sub>2</sub> Emission + Non – Combusted CO<sub>2</sub> Emission (tonnes)*

$$\text{CH}_4 \text{ (tonnes)} = \text{Flare Volume (e}^3\text{m}^3\text{/year)} * (1 - \text{Combustion Efficiency}) * \text{Mole Fraction of CH}_4 * \text{CH}_4 \text{ Density (0.6785 } \frac{\text{kg}}{\text{m}^3}\text{)}$$

$$* \text{Unit Conversion (} \frac{\text{tonnes}}{10^3\text{kg}}\text{)}$$

*N<sub>2</sub>O Emission (tonnes/year)*

$$= \text{Flare Volume (e}^3\text{m}^3\text{/year)} * \text{Higher Heating Value (} \frac{\text{GJ}}{\text{e}^3\text{m}^3}\text{)} * \text{Emission Factor (} \frac{\text{kg}}{\text{GJ}}\text{)}$$

$$* \text{Unit Conversion (} \frac{\text{tonnes}}{10^3\text{kg}}\text{)}$$

Emission factor for N<sub>2</sub>O is taken from the Western Climate Initiative (WCI) QM (WCI 2011). This emission factor is used to convert flare volume to GHG emissions. The emission factor used for this activity is summarized in Table 3-10



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

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**Table 3-10 Flare N<sub>2</sub>O Emission Factors**

Emission Source	N <sub>2</sub> O Emission Factor (kg/GJ)
Flare	9.52 E-05
SOURCE: WCI QM (WCI 2011).	

### 3.2.2 Fugitive Emissions

Fugitive emissions are from unintentional releases of GHG's to the atmosphere from the equipment component that leaks as a result of wear, damage, etc. The sources of fugitive emissions include but are not limited to connectors, valves, pressure relief valves, flanges, pumps, etc. The Existing Facility's 2020 fugitive leak rate was provided by AES as 0.40 ft<sup>3</sup>/min (i.e., 5,953.33 m<sup>3</sup>/year). The same leak rate was used for the Project fugitive emission calculation as the Existing Facility is of the same size of the Project. The gas leaked from the Project is conservatively assumed to be natural gas. The natural gas (i.e., flare pilot and purge gas) composition can be found in Table 3-9.

Emissions are calculated as:

$$CO_2 \text{ Emission (tonnes/year)} = \text{Leak Rate (m}^3/\text{year)} * CO_2 \text{ Mole Fraction} * CO_2 \text{ Density (1.861 } \frac{kg}{m^3}) * \text{Unit Conversion (} \frac{\text{tonnes}}{10^3 kg}$$

$$CH_4 \text{ Emission (tonnes/year)} = \text{Leak Rate (m}^3/\text{year)} * CH_4 \text{ Mole Fraction} * CH_4 \text{ Density (0.6785 } \frac{kg}{m^3}) * \text{Unit Conversion (} \frac{\text{tonnes}}{10^3 kg}$$

## 3.3 THIRD-PARTY (INDIRECT) EMISSIONS

The third-party (indirect) emissions are also referred to as acquired energy GHG emissions. This assessment includes indirect emissions from the purchased electricity. The purchased electricity is used during the construction and operation phase of the Project. The purchased electricity will be used in wash pumps, and other auxiliary utilities during the construction phase. During the operation phase, the purchased electricity will be used in brine pumps, NGL pumps, processing equipment as well as auxiliary utilities. Electricity consumption for the construction and operation phase were estimated and provided by AES (Table 3-11). The GHG emissions associated with third-party electricity generation are calculated using the 2018 ECCC NIR electricity consumption intensity factor for Alberta (ECCC 2020) as summarized in Table 3-12. The electricity consumption intensity factor for Alberta is expected to decline in to 270 g/KWh by 2032 as per Natural Resources Canada (NRCAN) Carbon Offset Emission Factor (NRCAN, 2020). Therefore, the indirect emissions estimated from the Project using the 2018 ECCC NIR electricity consumption intensity factor is conservative.

**Table 3-11 Imported Electricity Consumption**

Activity	Electricity Consumption
Construction Phase	25,018.00 MWh
Operation Phase	87,600.00 MWh/year
SOURCE: Provided by AES	





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Indirect GHG emissions are calculated as:

$$\text{Emissions (t CO}_2\text{e)} = \text{Electricity Consumption (MWh)} * \text{Unit Conversion} \left( \frac{10^3 \text{ kWh}}{\text{MWh}} \right) * \text{Emission Factor} \left( \frac{\text{g CO}_2\text{e}}{\text{KWh}} \right) * \text{Unit Conversion} \left( \frac{\text{tonnes}}{10^6 \text{ g}} \right)$$

**Table 3-12 Emission Factors for Third-Party (Indirect) Emissions**

Emission Source	Consumption Intensity (g CO <sub>2</sub> e/KWh electricity consumed)
Purchased Electricity – Alberta	680.00
SOURCE: National Inventory Report Table A13-10 (ECCC 2020)	

### 3.4 UPSTREAM EMISSIONS

Upstream GHG emission sources include activities from the point of extraction of the resource until it reaches the Project. Specifically, these sources may emit GHG emissions during production, gathering, and processing of the volume of product corresponding to the total Project system capacity (Government of Canada 2016). Product throughput of the Project is estimated to be 50,000 barrels per day of NGLs (C3+) and 10,000 barrels (bbl) per day of condensate (C5+). This results in a volume of 3,481,717 cubic meter (m<sup>3</sup>) per year, using a conversion of 6.29 bbl/m<sup>3</sup> and 365 days per year. There are no publicly available upstream emission factors to calculate upstream emissions from C3+ and C5+ products but the upstream emission factors are available for natural gas. Hence, Stantec estimated the amount of natural gas required to produce the Project throughput volume using the typical natural gas composition in Canada. The typical natural gas in Canada contains about 8.1% of C3+ and 3% of C5+ (Pennstate, 2020). Stantec used these composition data and estimated that 55,163.01 e<sup>3</sup>m<sup>3</sup> of natural gas is required to produce 3,481,717 m<sup>3</sup> of the product (i.e. C3+ and C5+). The estimated natural gas volumes is then used to calculate the upstream emissions.

Upstream emissions are estimated using the ECCC published GHG emission factors from the Nova Gas Transmission Ltd. Towerbirch Expansion Project (ECCC 2017). For screening calculation purposes, it was assumed that the source of the natural gas for the Project would originate from the same upstream sources as the Towerbirch Expansion Project. Therefore, gas specifications used in the Towerbirch Expansion Project are representable and emission factors for upstream natural gas production can be used in a screening approach to making the estimate. Emission factors for the upstream screening assessment are provided in Table 3-13. Note that the emission factors are shown in Table 3-13 was taken from the Towerbirch Expansion Project (ECCC 2017) and have been adjusted to account for a conversion correction. The upstream emissions factors are only provided until 2030 in the Towerbirch Expansion Project document (ECCC 2017).

**Table 3-13 Annual Upstream GHG Emission Factors**

Year	Production		Gathering		Processing	
	t CO <sub>2</sub> e/ e <sup>3</sup> m <sup>3</sup> a	t CO <sub>2</sub> e/MMcf	t CO <sub>2</sub> e/ e <sup>3</sup> m <sup>3</sup> a	t CO <sub>2</sub> e/MMcf	t CO <sub>2</sub> e/ e <sup>3</sup> m <sup>3</sup> a	t CO <sub>2</sub> e/MMcf
2024	0.1088	3.08	0.0013	0.038	0.1190	3.37



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**Table 3-13 Annual Upstream GHG Emission Factors**

Year	Production		Gathering		Processing	
	t CO <sub>2</sub> e/ e <sup>3</sup> m <sup>3</sup> <sup>a</sup>	t CO <sub>2</sub> e/MMcf	t CO <sub>2</sub> e/ e <sup>3</sup> m <sup>3</sup> <sup>a</sup>	t CO <sub>2</sub> e/MMcf	t CO <sub>2</sub> e/ e <sup>3</sup> m <sup>3</sup> <sup>a</sup>	t CO <sub>2</sub> e/MMcf
2025	0.1088	3.08	0.0013	0.037	0.1190	3.37
2026	0.1088	3.08	0.0013	0.038	0.1190	3.37
2027	0.1088	3.08	0.0013	0.038	0.1190	3.37
2028	0.1088	3.08	0.0013	0.038	0.1180	3.34
2029	0.1088	3.08	0.0013	0.038	0.1165	3.3
2030	0.1088	3.08	0.0013	0.038	0.1151	3.26
NOTE:						
<sup>a</sup> Emission factors include a correction of t CO <sub>2</sub> e/MMcf to t CO <sub>2</sub> e/e <sup>3</sup> m <sup>3</sup> conversion provided in ECCC 2017.						
SOURCE: ECCC (2017)						

Estimated upstream GHG emissions are based on the following equation:

$$\text{Upstream GHG Emissions (t CO}_2\text{e)} = \text{Throughput Volume (e}^3\text{m}^3 \text{ of natural gas)} \times \text{Emission Factor } \left( \frac{\text{t CO}_2\text{e}}{\text{e}^3\text{m}^3} \right)$$



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Estimated Greenhouse Gas Emissions  
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## 4.0 ESTIMATED GREENHOUSE GAS EMISSIONS

### 4.1 CONSTRUCTION PHASE

The direct GHG emissions from the construction phase are presented in Table 4-1. The sources of GHGs include fuel combustion by on-road, off-road, other construction equipment, and activities associated with land clearing such as uproot, burning and decay. Construction emissions are mainly from off-road equipment (52%) followed by land clearing emissions (43%).

Construction phase is estimated to last for two and half years. To calculate the maximum annual direct emissions, it was assumed that the construction activity will spread evenly over the construction period. Therefore, the maximum annual direct emission for the construction phase is estimated to be 4,279.69 tCO<sub>2</sub>e.

**Table 4-1 Total Greenhouse Gas Emissions - Construction**

Emission Source	Total Construction Emissions (tonnes) <sup>a, b</sup>				Percent of Total Construction Emissions
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e	
Off-road construction equipment	5,431.31	0.15	0.47	5,573.85	52%
On-road construction equipment	209.18	0.01	0.012	212.88	2%
Other construction equipment	284.88	0.01	0.01	287.07	3%
Land clearing, burning and decay <sup>c</sup>	-	-	-	4,625.44	43%
<b>Totals (including Land clearing, burning and decay)</b>	<b>5,925.36</b>	<b>0.16</b>	<b>0.48</b>	<b>10,699.24</b>	<b>100%</b>

NOTE:  
<sup>a</sup> Totals may not sum due to rounding.  
<sup>b</sup> Construction emissions are for the entire construction period.  
<sup>c</sup> The emissions associated with land clearing assume all harvested material will be burnt. It is a conservative approach as AES does not plan to burn the harvested material.

### 4.2 OPERATION PHASE

The direct annual GHG emissions during operation are presented in Table 4-2. The emission source categories associated with the operation phase are flaring and fugitive sources. Operation emissions are mainly from flaring (94%) followed by fugitive (6%).

The maximum annual direct emission during the operation phase is expected to be 1,593.30 tCO<sub>2</sub>e.



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Estimated Greenhouse Gas Emissions  
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**Table 4-2 Total Greenhouse Gas Emissions - Operation**

Emission Source	Total Annual Operation Emissions (tonnes) <sup>a, b</sup>				Percent of Total Operation Emissions
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e	
Flaring	1,319.99	7.07	0.002	1,497.37	94%
Fugitive	0.00	3.84	0.00	95.93	6%
<b>Totals</b>	1,319.99	10.90	0.002	1,593.30	100%
NOTE: <sup>a</sup> Totals may not sum due to rounding <sup>b</sup> Operation emissions are on an annual basis					

### 4.3 THIRD-PARTY (INDIRECT) EMISSIONS

The indirect GHG emissions from electricity consumption during construction and operation phase are presented in Table 4-3.

Construction is estimated to last for two and half years. To calculate the maximum annual indirect emission, it was assumed that the construction activity will spread evenly over the construction period. Therefore, the maximum annual indirect emission for the construction phase is estimated to be 6,804.90 tCO<sub>2</sub>e.

**Table 4-3 Total Greenhouse Gas Emissions - Indirect Emissions**

Emission Source	Total Emissions (t CO <sub>2</sub> e)
Construction Phase	17,012.24 <sup>a</sup>
Operation Phase	59,568.00 <sup>b</sup>
NOTE: <sup>a</sup> Construction phase indirect emissions are for the entire construction period. <sup>b</sup> Operation phase indirect emissions are annual based.	

### 4.4 UPSTREAM SCREENING ASSESSMENT

The Project throughput may not be directly linked to increased upstream development. Upstream development has most likely already occurred with regards to exploration and readiness for production. However, the upstream assessment conservatively assumes the throughput for the Project is directly attributed to an increase in upstream development. Using the emission factors provided in the ECCC Assessment of Upstream Emissions related to the Towerbirch Expansion Project (ECCC 2017), the annual upstream GHG emissions from 2024 to 2030 are estimated for the Project by prorating them to



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Estimated Greenhouse Gas Emissions  
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the Project throughput volume; the results are presented in Table 4-4. The upstream emissions for the Project are estimated to be approximately 13 kilotonnes (kt) CO<sub>2</sub>e per year between 2024 to 2030.

Based on the screening assessment, the annual upstream GHG emissions are estimated to be less than the 500 kt CO<sub>2</sub>e/y threshold. As per the CER Filing Manual (CER 2020), no further assessment of upstream GHG emissions is required for the Project.

The upstream emissions factors in the Towerbirch Expansion Project document are only provided until 2030 (ECCC 2017). The operational phase of this Project is expected to last beyond 2030. Given that the estimated annual upstream emissions are well below the 500 kt CO<sub>2</sub>e/y threshold for 2020-2029, or the more stringent thresholds of 300 kt CO<sub>2</sub>e/year for the period of 2030-2039 or 200 kt CO<sub>2</sub>e/year for the period of 2040-2049, or 100 kt CO<sub>2</sub>e/year for 2050 and beyond (Government of Canada 2020), it is unlikely that the upstream emissions beyond 2030 would trigger the threshold. Therefore, upstream emissions are estimated out to 2030.

**Table 4-4 Upstream Greenhouse Gas Emissions for 2024 to 2030**

Year	Annual Upstream Emissions (kt CO <sub>2</sub> e)			
	Production	Gathering	Processing	Total
2024	6.00	0.07	6.56	12.64
2025	6.00	0.07	6.56	12.64
2026	6.00	0.07	6.56	12.64
2027	6.00	0.07	6.56	12.64
2028	6.00	0.07	6.51	12.58
2029	6.00	0.07	6.43	12.50
2030	6.00	0.07	6.35	12.42



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

Summary of Findings and Conclusions

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### 5.0 SUMMARY OF FINDINGS AND CONCLUSIONS

Key findings of the GHG calculations in this TDR are:

- The direct GHG emissions from the entire Project construction period is estimated to be 10,699.24 tCO<sub>2</sub>e (including emissions associated with land-use change), of which the emission from off-road equipment accounts for about 52% of the total construction emissions followed by land-use change (43%). Using the 2018 GHG emission totals for Canada (729,000 ktCO<sub>2</sub>e) and Alberta (273,000 ktCO<sub>2</sub>e) as a baseline, the direct emissions (excluding emissions associated with land-use change activities) during the construction phase represents 0.0008% and 0.002% of Canada's and Alberta's 2018 total annual GHG emissions (ECCC, 2020). In addition to this, the indirect GHG emission associated with imported electricity during construction is 17,012.24 tCO<sub>2</sub>e. Construction Phase is expected to last for two and half years. The maximum annual net GHG emission for Construction Phase, including both direct and indirect emissions, is estimated to be 11,084.59 tCO<sub>2</sub>e.
- During the construction phase, approximately 4 ha of trees and shrubs and 1 ha of grassland may be removed, and the land converted to industrial use for soil stockpiling. The release of carbon associated with this 5 ha of land is expected to be 4,625.44 tCO<sub>2</sub>e. The emissions represent approximately 0.0006% and 0.002% of 2018 Canada and Alberta total annual GHG emissions (ECCC, 2020). Therefore, land clearing is estimated to have an immaterial impact on climate change.
- The direct GHG emissions from Project operation is estimated to be 1,593.30 tCO<sub>2</sub>e/year, of which the emission from flaring accounts for about 94% of the annual operation emissions followed by fugitive (6%). Using the 2018 GHG emission totals for Canada and Alberta as a baseline, the direct emissions during the operational phase represents 0.0002% and 0.0006% of Canada's and Alberta's 2018 total annual GHG emissions (ECCC, 2020). In addition to this, the indirect GHG emission associated with imported electricity during operation is 59,568.00 tCO<sub>2</sub>e/year. The project does not capture and store CO<sub>2</sub> and there are no avoided emissions as a result of this Project. The maximum annual net GHG emission for Operation Phase, including both direct and indirect emissions, is estimated to be 61,161.30 tCO<sub>2</sub>e.
- A screening level estimate of upstream GHG emissions indicates that the upstream emissions associated with the Project are less than 500 kt CO<sub>2</sub>e per year.

The above GHG emission estimates incorporated several conservative assumptions such as:

- the construction activity would spread evenly over the construction period;
- the harvested material from the land clearing activities are conservatively assumed to be burned;
- the flare pilot and purge would be operating continuously;
- the Project would use a gas chromatograph and it would run continuously;
- the annual electricity use is conservatively based upon equipment electrical ratings; and



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

### Summary of Findings and Conclusions

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- the electrical grid GHG intensity is based upon 2018 intensity although it is forecast to decline in future years.

Overall, the GHG emissions associated with Project construction and operation are low in magnitude when compared to provincial and national emission totals.



## ATCO SALT CAVERN STORAGE EXPANSION PROJECT

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### 6.0 REFERENCES

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# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## APPENDIX D – EXISTING EPEA APPROVAL 357248-00-01, AS AMENDED



# APPROVAL

## ALBERTA ENERGY REGULATOR

### ***ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT*** **R.S.A. 2000, c.E-12, as amended.**

APPROVAL NO.: 357248-00-00

APPLICATION NO.: 001-357248

EFFECTIVE DATE: June 24, 2015

EXPIRY DATE: May 31, 2025

APPROVAL HOLDER: ATCO Energy Solutions Ltd.

ACTIVITY: **Construction, operation and reclamation of the.**

Strathcona Salt Cavern Storage Project and associated Brine Storage Pond

**is subject to the attached terms and conditions.**

<original signed by>

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Gary Sasseville  
Approvals Manager, Authorizations Branch  
Alberta Energy Regulator

June 24, 2015

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## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

### **PART 1: DEFINITIONS**

#### **SECTION 1.1: DEFINITIONS**

- 1.1.1 All definitions from the Act and the regulations apply except where expressly defined in this approval.
- 1.1.2 In all PARTS of this approval:
- (a) “Act” means the *Environmental Protection and Enhancement Act*, R.S.A. 2000, c.E-12, as amended;
  - (b) “air effluent stream” means any substance in a gaseous medium released by or from a plant;
  - (c) “application” means the written submissions from the approval holder to the Director in respect of application number 001-357248 and any subsequent applications where amendments are issued for this approval;
  - (d) “container” means any portable device in which a substance is kept, including but not limited to drums, barrels and pails which have a capacity greater than 18 litres but less than 210 litres;
  - (e) “day”, when referring to sampling, means any sampling period of 24 consecutive hours;
  - (f) “decommissioning” means the dismantling and decontamination of a plant undertaken subsequent to the termination or abandonment of any activity or any part of any activity regulated under the Act;
  - (g) “decontamination” means the treatment or removal of substances from the plant and affected lands;
  - (h) “Director” means an authorized employee of the Alberta Energy Regulator;
  - (i) “dismantling” means the removal of buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling facilities, railways, roadways, pipelines and any other installations that are being or have been used or held for or in connection with the plant;
  - (j) “domestic wastewater” means wastewater that is the composite of liquid and water-carried wastes associated with the use of water for drinking, cooking, cleaning, washing, hygiene, sanitation or other domestic purposes, together with any infiltration and inflow wastewater, that is released into a wastewater collection system;

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- (k) “fugitive emissions” means emissions of substances to the atmosphere other than ozone depleting substances, originating from a plant source other than a flue, vent, or stack but does not include sources which may occur due to breaks or ruptures in process equipment;
- (l) “grab”, when referring to a sample, means an individual sample collected in less than 30 minutes and which is representative of the substance sampled;
- (m) “ISO/IEC 17025” means the international standard, developed and published by International Organization for Standardization (ISO), specifying management and technical requirements for laboratories;
- (n) “industrial runoff” means precipitation that falls on or traverses the plant developed area;
- (o) “industrial runoff control system” means the parts of the plant that collect, store or treat industrial runoff from the plant;
- (p) “industrial wastewater” means the composite of liquid wastes and water-carried wastes, any portion of which results from any industrial process carried on at the plant;
- (q) “industrial wastewater control system” means the parts of the plant that collect, store or treat industrial wastewater;
- (r) “month” means calendar month;
- (s) “plant” means all buildings, structures, process and pollution abatement equipment, vessels, storage facilities, material handling facilities, roadways, railways, pipelines and other installations, and includes the land, located on the Southwest Quarter of Section 34, Township 55, Range 21, West of the 4<sup>th</sup> Meridian, that is being or has been used or held for or in connection with the Strathcona salt cavern and brine storage pond;
- (t) “plant developed area” means the areas of the plant used for the storage, treatment, processing, transport, or handling of raw material, intermediate product, by-product, finished product, process chemicals, or waste material;
- (u) “QA/QC” means quality assurance and quality control;
- (v) “regulations” means the regulations enacted pursuant to the Act, as amended;
- (w) “soil” means mineral or organic earthen materials that can, have, or are being altered by weathering, biological processes, or human activity;

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- (x) “tank” means a stationary device, designed to contain an accumulation of a substance, which is constructed primarily of non-earthen materials that provide structural support including wood, concrete, steel, and plastic;
- (y) “topsoil” means the uppermost layer of soil and consists of:
  - (i) the A-horizons and all organic horizons as defined in *The Canadian System of Soil Classification* (Third Edition), Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended, and
  - (ii) the soil ordinarily moved during tillage;
- (z) “upper subsoil” means the layer of soil directly below the topsoil layer that consists of the B-horizons as defined in *The Canadian System of Soil Classification*, (Third Edition), Agriculture and Agri-Food Canada, Publication 1646, 1998, as amended;
- (aa) “volume estimate” means a technical evaluation based on the sources contributing to the release including but not limited to pump capabilities water metres, and batch release volumes;
- (bb) “week” means any consecutive 7-day period; and
- (cc) “year” means calendar year, unless otherwise specified.

### **PART 2: GENERAL**

#### **SECTION 2.1: REPORTING**

- 2.1.1 The approval holder shall immediately report to the Director by telephone any contravention of the terms and conditions of this approval at 1-780-422-4505.
- 2.1.2 The approval holder shall submit a written report to the Director within 7 days of the reporting pursuant to 2.1.1.
- 2.1.3 The approval holder shall immediately notify the Director in writing if any of the following events occurs:
  - (a) the approval holder is served with a petition into bankruptcy;
  - (b) the approval holder files an assignment in bankruptcy or Notice of Intent to make a proposal;
  - (c) a receiver or receiver-manager is appointed;

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- (d) an application for protection from creditors is filed for the benefit of the approval holder under any creditor protection legislation; or
  - (e) any of the assets which are the subject matter of this approval are seized for any reason.
- 2.1.4 If the approval holder monitors for any substances or parameters which are the subject of operational limits as set out in this approval more frequently than is required and uses procedures authorized in this approval, then the approval holder shall provide the results of such monitoring as an addendum to the reports required by this approval.
- 2.1.5 The approval holder shall submit all monthly reports required by this approval to be compiled or submitted to the Director on or before the end of the month following the month in which the information was collected, unless otherwise specified in this approval.
- 2.1.6 The approval holder shall submit all annual reports required by this approval to be compiled or submitted to the Director on or before March 31 of the year following the year in which the information was collected, unless otherwise specified in this approval.

### **SECTION 2.2: RECORD KEEPING**

2.2.1 The approval holder shall:

- (a) record; and
- (b) retain

all the following information in respect of any sampling conducted or analyses performed in accordance with this approval for a minimum of ten years, unless otherwise authorized in writing by the Director:

- (i) the place, date and time of sampling,
- (ii) the dates the analyses were performed,
- (iii) the analytical techniques, methods or procedures used in the analyses,
- (iv) the names of the persons who collected and analysed each sample, and
- (v) the results of the analyses.

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

### **SECTION 2.3: ANALYTICAL REQUIREMENTS**

2.3.1 With respect to any sample required to be taken pursuant to this approval, the approval holder shall ensure that:

- (a) collection;
- (b) preservation;
- (c) storage;
- (d) handling; and
- (e) analysis

shall be conducted in accordance with the following unless otherwise authorized in writing by the Director:

- (i) for industrial wastewater, industrial runoff, groundwater and domestic wastewater:
  - (A) the *Standard Methods for the Examination of Water and Wastewater*, published jointly by the American Public Health Association, American Water Works Association, and the Water Environment Federation, 1998, as amended;
- (ii) for soil:
  - (A) the *Soil Monitoring Directive*, Alberta Environment, May 2009, as amended,
  - (B) the *Soil Quality Criteria Relative to Disturbance and Reclamation*, Alberta Agriculture, March 1987, as amended, and
  - (C) the *Directive for Monitoring the Impact of Sulphur Dust on Soils*, Alberta Environment and Water, December 2011, as amended;

2.3.2 The approval holder shall analyse all samples that are required to be obtained by this approval in a laboratory accredited pursuant to ISO/IEC 17025, as amended, for the specific parameter(s) to be analysed, unless otherwise authorized in writing by the Director.



**TERMS AND CONDITIONS ATTACHED TO APPROVAL**

2.3.3 The term sample used in 2.3.2 does not include samples directed to continuous monitoring equipment, unless specifically required in writing by the Director.

2.3.4 The approval holder shall comply with the terms and conditions of any written authorization issued by the Director under 2.3.2.

**SECTION 2.4: OTHER**

2.4.1 The terms and conditions of this approval are severable. If any term or condition of this approval or the application of any term or condition is held invalid, the application of such term or condition to other circumstances and the remainder of this approval shall not be affected thereby.

2.4.2 All industrial wastewater and process liquids contained in aboveground and underground storage tanks shall be contained in accordance with the Alberta Energy Regulator Directive D-55: *Storage Requirements for the Upstream Petroleum Industry*, as amended.

2.4.3 All above ground storage tanks containing liquid hydrocarbons or organic compounds shall conform to the *Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks*, Canadian Council of Ministers of the Environment, PN 1180, 1995, as amended.

**PART 3: CONSTRUCTION**

**SECTION 3.1: GENERAL**

3.1.1 The approval holder shall construct the brine pond as described in application 001-357248, unless otherwise authorized in writing by the Director.

3.1.2 If construction of the brine pond as described in application 001-357248 has not commenced by June 1, 2016, the approval holder shall apply for an amendment to this approval.

**SECTION 3.2: AIR**

3.2.1 The approval holder shall construct the stacks identified in TABLE 3.2-A according to the corresponding height requirements referred to in the TABLE 3.2-A.

**TABLE 3.2-A STACK HEIGHTS**

STACK	MINIMUM HEIGHT ABOVE GRADE (metres)
Degasification Flare Stack	40.0

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

3.2.2 The approval holder shall install the following minimum systems on the degasification flare stack:

- (a) wind guard;
- (b) pilot light; and
- (c) electric igniter

unless an equivalent system is authorized in writing by the Director.

### **SECTION 3.3: INDUSTRIAL WASTEWATER**

3.3.1 The approval holder shall implement the Erosion and Sediment Control Plan during construction as described in the application, unless otherwise authorized in writing by the Director.

### **SECTION 3.4: WASTE MANAGEMENT**

Not used at this time.

### **SECTION 3.5: DOMESTIC WASTEWATER**

Not used at this time.

### **SECTION 3.6: LAND CONSERVATION**

3.6.1 The approval holder shall:

- (a) salvage; and
- (b) conserve

all topsoil for land reclamation.

3.6.2 The approval holder shall:

- (a) salvage; and
- (b) conserve

all upper subsoil for land reclamation.

3.6.3 The approval holder shall:

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

(a) conserve; and

(b) stockpile

all topsoil separately from the upper subsoil.

3.6.4 The approval holder shall locate all:

(a) topsoil stockpiles; and

(b) upper subsoil stockpiles

at the plant.

3.6.5 The approval holder shall stockpile all topsoil as follows:

(a) on stable foundations; and

(b) on undisturbed topsoil.

3.6.6 The approval holder shall stockpile all upper subsoil as follows:

(a) on stable foundations; and

(b) on areas where the topsoil has been removed.

3.6.7 The approval holder shall take all steps necessary to prevent erosion, including but not limited to, all of the following:

(a) revegetating the stockpiles; and

(b) any other steps authorized in writing by the Director.

3.6.8 The approval holder shall immediately suspend conservation of:

(a) topsoil; and

(b) upper subsoil

when wet or frozen conditions will result in mixing, loss or degradation of topsoil or upper subsoil.

3.6.9 The approval holder shall recommence conservation of:

(a) topsoil; and

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

(b) upper subsoil

only when wet or frozen field conditions in 3.6.8 no longer exist.

### **PART 4: OPERATIONS, LIMITS, MONITORING AND REPORTING**

#### **SECTION 4.1: AIR**

##### **OPERATIONS**

4.1.1 The approval holder shall not release any air effluent streams to the atmosphere except as authorized by this approval.

4.1.2 The approval holder shall only release air effluent streams to the atmosphere from the following sources:

- (a) the degasification flare stack;
- (b) the space ventilation exhaust stacks;
- (c) the space heater exhaust vents; and
- (d) any other source authorized in writing by the Director.

4.1.3 The approval holder shall maintain the following stacks according to the minimum height requirements specified in TABLE 4.1-A.

**TABLE 4.1-A STACK HEIGHTS**

<b>STACK</b>	<b>MINIMUM HEIGHT ABOVE GRADE (metres)</b>
Degasification flare stack	40.0

4.1.4 The approval holder shall continuously operate the degasification flare stack identified with the following minimum systems:

- (a) wind guard;
- (b) pilot light; and
- (c) electric igniter

unless an equivalent system is authorized in writing by the Director.

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- 4.1.5 The approval holder shall control fugitive emissions and any source not specified in 4.1.2 in accordance with 4.1.6 of this approval unless otherwise authorized in writing by the Director.
- 4.1.6 With respect to fugitive emissions and any source not specified in 4.1.2, the approval holder shall not release a substance or cause to be released a substance that causes or may cause any of the following:
- (a) impairment, degradation or alteration of the quality of natural resources;
  - (b) material discomfort, harm or adverse effect to the well being or health of a person; or
  - (c) harm to property or to vegetative or animal life.
- 4.1.7 The approval holder shall not burn any debris by means of an open fire unless authorized in writing by the Director.
- 4.1.8 The approval holder shall ensure the combustion of all combustible gases released to the degasification flare stack.

### **AIR LIMITS**

Not used at this time

### **MONITORING AND REPORTING**

Not used at this time

## **SECTION 4.2: INDUSTRIAL WASTEWATER AND RUNOFF**

### **OPERATIONS**

- 4.2.1 The approval holder shall not release any substances from the plant to the surrounding watershed except as authorized by this approval.
- 4.2.2 The approval holder shall only dispose of industrial wastewater as follows:
- (a) to the brine pond;
  - (b) to an Alberta Energy Regulator approved disposal well; or
  - (c) as otherwise authorized in writing by the Director.

**TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- 4.2.3 All liquids collected in the liner leakage collection system shall be returned to the brine pond.
- 4.2.4 The approval holder shall implement the Erosion and Sediment Control Plan as described in the application, unless otherwise authorized in writing by the Director.
- 4.2.5 The approval holder shall direct all industrial runoff from the plant developed area to the area identified in the application as Wetland W3.
- 4.2.6 The approval holder shall only release water collected by the Groundwater Dewatering System to:
  - (a) the river water storage tank;
  - (b) the brine pond;
  - (c) to Wetland W3 as described in the application, subject to meeting the limits of Table 4.2-A;
  - (d) to an Alberta Energy Regulator approved disposal well only if the water cannot be treated to meet the limits specified in TABLE 4.2-A; or
  - (e) as otherwise authorized in writing by the Director.

**TABLE 4.2-A: SPECIFIED LIMITS FOR THE GROUNDWATER DEWATERING SYSTEM**

PARAMETER	PARAMETER OR CONCENTRATION LIMITS
Chloride	< 120 mg/l

- 4.2.7 The action leakage rate for the Industrial Wastewater Control System is set by the maximum limits for the parameters specified in TABLE 4.2-B.

**TABLE 4.2-B: INDUSTRIAL WASTEWATER CONTROL SYSTEM LIMITS**

INDUSTRIAL WASTEWATER CONTROL SYSTEM	
LEAKAGE COLLECTION SYSTEM	
POND	ACTION LEAKAGE RATE (m <sup>3</sup> /month)
#1	1110

**TERMS AND CONDITIONS ATTACHED TO APPROVAL**

4.2.8 The approval holder shall implement the Leak Detection Response Action Plan as per the application when the Action Leakage Rate is exceeded.

**MONITORING**

**INDUSTRIAL WASTEWATER CONTROL SYSTEM**

4.2.9 The approval holder shall monitor the liner leakage collection system of the Industrial Wastewater Control System as required in TABLE 4.2-C.

4.2.10 The approval holder shall report the results of the Industrial Wastewater Control System monitoring per 4.2.9 to the Director as required in TABLE 4.2-C.

**TABLE 4.2-C INDUSTRIAL WASTEWATER CONTROL SYSTEM MONITORING AND REPORTING**

MONITORING			REPORTING
Parameter	Frequency	Sample Type	Frequency
Flow (m <sup>3</sup> /week)	Weekly	Estimated based on recorded sump volumes or pump capacities and time pumped	Annual
Chloride	Monthly	Grab	

4.2.11 The approval holder shall collect a representative grab sample of the brine pond twice per year, and have the sample analysed for parameters characteristic of the pond contents, unless otherwise authorized in writing by the Director.

4.2.12 The approval holder shall report the results of the samples taken as per 4.2.11 annually.

**GROUNDWATER DEWATERING BENEATH THE BRINE POND**

4.2.13 The approval holder shall monitor water collected by the Groundwater Dewatering System as required in TABLE 4.2-D.

**TERMS AND CONDITIONS ATTACHED TO APPROVAL**

**TABLE 4.2-D: GROUNDWATER DEWATERING SYSTEM MONITORING AND REPORTING**

PARAMETER, TEST, EVENT, STUDY PROPOSAL OR REPORTING REQUIREMENT	MONITORING					REPORTING
	PRIOR TO RELEASE		THROUGHOUT THE RELEASE PERIOD			FREQUENCY
	Frequency	Sample Type	Frequency	Sample Type	Sample Location	
Discharge volume (m <sup>3</sup> )	Once	n/a	Once/day	Volume estimate as described in application	Groundwater sump in the brine pump house as described in the application	Annual
Routine and Major Ions	Once - within one week of release	grab	Once/week	Grab		
Metals		grab	Once/week	Grab		

4.2.14 The approval holder shall report to the Director the results of the Groundwater Dewatering System monitoring per 4.2.13 as required in TABLE 4.2-D.

**WETLAND W3**

4.2.15 The approval holder shall submit a Wetland W3 Monitoring Program to the Director by September 1, 2015.

4.2.16 The Wetland W3 Monitoring Program shall include, at a minimum, the following:

- (a) sampling locations;
- (b) monitoring, sampling, and analytical schedules and procedures;
- (c) photographs of the work areas:
  - (i) pre-construction,
  - (ii) during construction,
  - (iii) post construction; and



## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- (d) any other information requested in writing by the Director.
- 4.2.17 The approval holder shall implement the Wetland W3 Monitoring Program as authorized in writing by the Director.

### **REPORTING**

- 4.2.18 The approval holder shall submit an annual Industrial Wastewater and Industrial Runoff Report to the Director.
- 4.2.19 The annual Industrial Wastewater and Industrial Runoff Report shall include, at a minimum, all of the following information:
- (a) an assessment of the performance of the:
    - (i) Industrial Wastewater Control System,
    - (ii) Groundwater Dewatering System, and
    - (iii) Industrial Runoff Control System;
  - (b) an overview of the operation of the plant;
  - (c) a summary and evaluation of management and disposal of the industrial wastewater for the previous year;
  - (d) a summary and evaluation of management and disposal of industrial runoff for the previous year;
  - (e) a summary and evaluation of the management of Wetland W3 for the previous year;
  - (f) the results of monitoring conducted of:
    - (i) the Industrial Wastewater Control System pursuant to 4.2.10 and 4.2.12;
    - (ii) the Groundwater Dewatering System pursuant to 4.2.14;
    - (iii) Wetland W3 pursuant to 4.2.17; and
  - (g) any other information as required in writing by the Director.

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

### **SECTION 4.3: WASTE MANAGEMENT**

Not used at this time

### **SECTION 4.4: DOMESTIC WASTEWATER**

Not used at this time

### **SECTION 4.5: GROUNDWATER**

- 4.5.1 The approval holder shall develop a proposal for a Groundwater Monitoring Program for the plant which shall include, at a minimum, all of the following:
- (a) a hydrogeologic description and interpretation of the plant;
  - (b) a map and description of surface water drainage patterns for the plant;
  - (c) a lithologic description and maps, including cross-sections, of the surficial and the upper bedrock geologic materials at the plant;
  - (d) a site map showing the location and type of current and historical potential sources of groundwater contamination;
  - (e) a cross-section(s) showing depth to water table, patterns of groundwater movement and hydraulic gradients at the plant;
  - (f) the hydraulic conductivity of all surficial and bedrock materials at the plant;
  - (g) a map showing the location of existing and additional proposed groundwater monitoring wells at the plant;
  - (h) a lithologic description of all boreholes drilled at the plant;
  - (i) construction and completion details of existing groundwater monitoring wells;
  - (j) a rationale for proposed groundwater monitoring well locations and proposed completion depths of those wells;
  - (k) a description of groundwater monitoring well development protocols;
  - (l) a list of parameters to be monitored and the monitoring frequency for each groundwater monitoring well or group of groundwater monitoring wells at the plant;

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- (m) a description of the groundwater sampling and analytical QA/QC procedures;
  - (n) details of a groundwater response plan specifying actions to be taken should contaminants be identified through the Groundwater Monitoring Program; and
  - (o) any other information relevant to groundwater quality at the plant.
- 4.5.2 The approval holder shall submit the the Groundwater Monitoring Program proposal to the Director on or before November 1, 2015.
- 4.5.3 If the Groundwater Monitoring Program proposal is found deficient by the Director, the approval holder shall correct all deficiencies as outlined in writing by the Director, within the timeline specified in writing by the Director.
- 4.5.4 The approval holder shall implement the Groundwater Monitoring Proposal as authorized in writing by the Director.
- 4.5.5 The approval holder shall:
- (a) protect from damage; and
  - (b) keep locked except when being sampled
- all groundwater monitoring wells unless otherwise authorized in writing by the Director.
- 4.5.6 If a representative groundwater sample cannot be collected because the groundwater monitoring well is damaged or is no longer capable of producing a representative groundwater sample, the approval holder shall:
- (a) clean, repair or replace the groundwater monitoring well; and
  - (b) collect and analyse a representative groundwater sample prior to the next scheduled sampling event
- unless otherwise authorized in writing by the Director.
- 4.5.7 In addition to the sampling information recorded in 2.2.1, the approval holder shall record the following sampling information for all groundwater samples collected:
- (a) a description of purging and sampling procedures;
  - (b) the static elevations above sea level, and depth below ground surface of fluid phases in the groundwater monitoring well prior to purging;

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- (c) the temperature of each sample at the time of sampling;
  - (d) the pH of each sample at the time of sampling; and
  - (e) the specific conductance of each sample at the time of sampling.
- 4.5.8 The approval holder shall carry out remediation of the groundwater in accordance with the following:
- (a) for soil or groundwater, *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*, Alberta Environment and Sustainable Resource Development, May 2014, as amended; and
  - (b) for soil or groundwater, *Alberta Tier 2 Soil and Groundwater Remediation Guidelines*, Alberta Environment and Sustainable Resource Development, May 2014, as amended.
- 4.5.9 The approval holder shall compile a Groundwater Monitoring Report which shall include, at a minimum, all of the following information:
- (a) a completed *Record of Site Condition Form*, Alberta Environment, 2014, as amended;
  - (b) a legal land description of the plant and a map illustrating the plant boundaries;
  - (c) a topographic map of the plant;
  - (d) a description of the industrial activity and processes;
  - (e) a map showing the location of all surface and groundwater users, and, a listing describing surface water and water well use details, within at least a five kilometre radius of the plant;
  - (f) a general hydrogeological characterization of the region within a five kilometre radius of the plant;
  - (g) a detailed hydrogeological characterization of the plant, including an interpretation of groundwater flow patterns;
  - (h) a cross-section showing depth to water table, patterns of groundwater movement and hydraulic gradients at the plant;
  - (i) borehole logs and completion details for groundwater monitoring wells;

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- (j) a map showing locations of all known buried channels within at least five kilometre of the plant;
- (k) a map of surface drainage within the plant and surrounding area to include nearby water bodies;
- (l) a map of groundwater monitoring well locations and a table summarizing the existing groundwater monitoring program for the plant;
- (m) a summary of any changes to the groundwater monitoring program made since the last groundwater monitoring report;
- (n) analytical data recorded as required in 4.5.6(b);
- (o) a summary of fluid elevations recorded as required in 4.5.7(b) and an interpretation of changes in fluid elevations;
- (p) an interpretation of QA/QC program results;
- (q) an interpretation of all the data in this report, including the following:
  - (i) diagrams indicating the location and extent of any contamination,
  - (ii) a description of probable sources of contamination, and
  - (iii) a site map showing the location and type of current and historical potential sources of groundwater contamination;
- (r) a summary and interpretation of the data collected since the groundwater monitoring program began including:
  - (i) control charts which indicate trends in concentrations of parameters, and
  - (ii) the migration of contaminants;
- (s) a description of the following:
  - (i) contaminated groundwater remediation techniques employed,
  - (ii) source elimination measures employed,
  - (iii) risk assessment studies undertaken, and
  - (iv) risk management studies undertaken;

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- (t) a proposed sampling schedule for the following year; and
  - (u) recommendations for changes to the groundwater monitoring program to make it more effective.
- 4.5.10 The approval holder shall submit the Groundwater Monitoring Report to the Director on or before March 31 of every year commencing in the year 2017, unless otherwise authorized in writing by the Director.
- 4.5.11 If the Groundwater Monitoring Report is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director, within the timeline specified in writing by the Director.

### **SECTION 4.6: SOIL**

- 4.6.1 In addition to any other requirements specified in this approval, the approval holder shall conduct all of the following activities related to soil monitoring and soil management required by this approval in accordance with the *Soil Monitoring Directive*, Alberta Environment, 2009, as amended:
- (a) designing and developing proposals for the Soil Monitoring Program;
  - (b) designing and developing proposals for the Soil Management Program;
  - (c) all other actions, including sampling, analysing, and reporting, associated with the Soil Monitoring Program; and
  - (d) all other actions, including sampling, analysing and reporting, associated with the Soil Management Program.

### **MONITORING AND REPORTING**

- 4.6.2 The approval holder shall submit the Soil Monitoring Program proposal to the Director according to the following schedule:
- (a) for the first soil monitoring event on or before May 1, 2017; and
  - (b) for the second soil monitoring event on or before May 1, 2022;
- unless otherwise authorized in writing by the Director.
- 4.6.3 If any Soil Monitoring Program proposal is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- 4.6.4 Subject to 4.6.3, the approval holder shall implement the Soil Monitoring Program as authorized in writing by the Director.
- 4.6.5 If an authorization or a deficiency letter is not issued within 120 days of the applicable date required by 4.6.2, the approval holder shall implement the Soil Monitoring Program:
- (a) in accordance with the program as set out in the proposal submitted by the approval holder; and
  - (b) within 270 days after the applicable date required by 4.6.2.
- 4.6.6 The approval holder shall submit to the Director each Soil Monitoring Program Report obtained from the soil monitoring referred to in 4.6.4 and 4.6.5 according to the following schedule:
- (a) for the first Soil Monitoring Program Report on or before May 1, 2018; and
  - (b) for the second Soil Monitoring Program Report on or before May 1, 2023;
- unless otherwise authorized in writing by the Director.
- 4.6.7 If any Soil Monitoring Program Report is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

### **SOIL MANAGEMENT PROGRAM**

- 4.6.8 If the Soil Monitoring Program, or any other soil monitoring, reveals that there are substances present in the soil at concentrations greater than any of the applicable concentrations set out in the standards in the *Soil Monitoring Directive*, Alberta Environment, 2009, as amended, the approval holder shall develop a Soil Management Program Proposal.
- 4.6.9 If a Soil Management Program Proposal is required pursuant to 4.6.8, the approval holder shall submit a Soil Management Program Proposal to the Director according to the following schedule:
- (a) for Soil Management Program Proposal that is triggered by the findings from the first soil monitoring event on or before the date in 4.6.6(a);
  - (b) for Soil Management Program Proposal that is triggered by the findings from a second soil monitoring event on or before the date in 4.6.6(b); or

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- (c) for any other soil monitoring event not specified in this approval within six months of completion of the soil monitoring event.
- 4.6.10 If any Soil Management Program Proposal is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.
- 4.6.11 The approval holder shall implement the Soil Management Program as authorized in writing by the Director.
- 4.6.12 If the approval holder is required to implement a Soil Management Program pursuant to 4.6.11, the approval holder shall submit a written Soil Management Program Report to the Director on or before March 31 of each year following the year in which the information was collected, unless otherwise authorized in writing by the Director.
- 4.6.13 If any Soil Management Program Report is found deficient by the Director, the approval holder shall correct all deficiencies identified by the Director by the date specified in writing by the Director.

### **PART 5: FINANCIAL SECURITY REQUIREMENTS**

Not used at this time

### **PART 6: DECOMMISSIONING AND LAND RECLAMATION**

#### **SECTION 6.1: GENERAL**

- 6.1.1 The approval holder shall apply for an amendment to this approval to reclaim the plant by submitting a:
  - (a) Decommissioning Plan; and
  - (b) Land Reclamation Planto the Director.
- 6.1.2 The approval holder shall submit the:
  - (a) Decommissioning Plan; and
  - (b) Land Reclamation Planreferred to in 6.1.1 within six months of the plant ceasing operation, except for repairs and maintenance, unless otherwise authorized in writing by the Director.



## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

### **SECTION 6.2: DECOMMISSIONING**

6.2.1 The Decommissioning Plan referred to in 6.1.1 shall include, at a minimum, all of the following:

- (a) a plan for dismantling the plant;
- (b) a comprehensive study to determine the nature, degree and extent of contamination at the plant and affected lands;
- (c) a plan to manage all wastes at the plant;
- (d) evaluation of remediation technologies proposed to be used at the plant and affected lands;
- (e) a plan for decontamination of the plant and affected lands in accordance with the following:
  - (i) for soil or groundwater, *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*, Alberta Environment and Sustainable Resource Development, May 2014, as amended;
  - (ii) for soil or groundwater, *Alberta Tier 2 Soil and Groundwater Remediation Guidelines*, Alberta Environment and Sustainable Resource Development, May 2014, as amended;
  - (iii) for drinking water, *Canadian Environmental Quality Guidelines*, Canadian Council of Ministers of the Environment, PN1299, 1999, as amended; and
  - (iv) for surface water, *Environmental Quality Guidelines for Alberta Surface Water Quality Guidelines for Use in Alberta*, Alberta Environment and Sustainable Resource Development, April 2014, as amended;
- (f) confirmatory testing to indicate compliance with the remediation objectives;
- (g) a plan for maintaining and operating contaminant monitoring systems;
- (h) a schedule for activities (a) through (g) above; and
- (i) any other information as required in writing by the Director.

## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

- 6.2.2 If the Decommissioning Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

### **SECTION 6.3: LAND RECLAMATION**

- 6.3.1 The Land Reclamation Plan referred to in 6.1.1 shall include, at a minimum, all of the following:
- (a) the final use of the reclaimed area and how equivalent land capability will be achieved;
  - (b) removal of infrastructure;
  - (c) restoration of drainage;
  - (d) soil replacement;
  - (e) erosion control;
  - (f) revegetation and conditioning of the plant including:
    - (i) species list, seed source and quality, seeding rates and methods,
    - (ii) fertilization rates and methods, and
    - (iii) wildlife habitat plans where applicable;
  - (g) reclamation schedule; and
  - (h) any other information as required in writing by the Director.
- 6.3.2 If the Land Reclamation Plan is found deficient by the Director, the approval holder shall correct all deficiencies identified in writing by the Director by the date specified in writing by the Director.

**TERMS AND CONDITIONS ATTACHED TO APPROVAL**

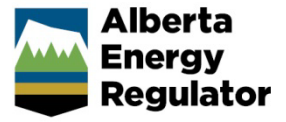
<original signed by>

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Gary Sasseville  
Approvals Manager, Authorizations Branch  
Alberta Energy Regulator

June 24, 2015

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# AMENDING APPROVAL

## ALBERTA ENERGY REGULATOR

### ***ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT*** **R.S.A. 2000, c.E-12, as amended.**

APPROVAL NO.: 357248-00-01

APPLICATION NO.: 002-357248

EFFECTIVE DATE: May 26, 2016

EXPIRY DATE: May 31, 2025

APPROVAL HOLDER: ATCO Energy Solutions Ltd.

Pursuant to Division 2, of Part 2, of the *Environmental Protection and Enhancement Act*, R.S.A.2000, c.E-12, as amended, the approval for the following activity:

Construction, Operation and Reclamation of the Strathcona Salt Cavern Storage Project and associated Brine Storage Pond

is amended as per the attached terms and conditions.

<original signed by>

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Ayan Sarker  
Acting Approvals Manager, Authorizations Branch  
Alberta Energy Regulator

May 26, 2016

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## **TERMS AND CONDITIONS ATTACHED TO APPROVAL**

*Environmental Protection and Enhancement Act Approval No. 357248-00-00* is hereby amended as follows:

1. Table 3.2-A is deleted and the following is substituted:

**TABLE 3.2-A STACK HEIGHTS**

<b>STACK</b>	<b>MINIMUM HEIGHT ABOVE GRADE (metres)</b>
Degasification Flare Stack	19.9

2. Table 4.1-A is deleted and the following is substituted:

**TABLE 4.1-A STACK HEIGHTS**

<b>STACK</b>	<b>MINIMUM HEIGHT ABOVE GRADE (metres)</b>
Degasification Flare Stack	19.9

<original signed by>

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Ayan Sarker  
Acting Approvals Manager, Authorizations Branch  
Alberta Energy Regulator

May 26, 2016

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# ATCO SALT CAVERN STORAGE EXPANSION PROJECT

## APPENDIX E – LAND TITLES



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

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

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OWNERS

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

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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 )







CERTIFIED COPY OF  
Certificate of Title

M00065

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LINC  
0024 385 685

SHORT LEGAL  
4;21;55;27;NW

TITLE NUMBER: 142 118 161  
TRANSFER OF LAND  
DATE: 25/04/2014

AT THE TIME OF THIS CERTIFICATION

ATCO ENERGY SOLUTIONS LTD.  
OF 200, 919 - 11 AVENUE SW  
CALGARY  
ALBERTA T2R 1P3

IS THE OWNER OF AN ESTATE IN FEE SIMPLE  
OF AND IN

\*ALL MINES AND MINERALS WITHIN, UPON OR UNDER:

MERIDIAN 4 RANGE 21 TOWNSHIP 55  
SECTION 27  
QUARTER NORTH WEST

SUBJECT TO THE ENCUMBRANCES, LIENS AND INTERESTS NOTIFIED BY MEMORANDUM UNDER-  
WRITTEN OR ENDORSED HEREON, OR WHICH MAY HEREAFTER BE MADE IN THE REGISTER.

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION

NUMBER      DATE (D/M/Y)      PARTICULARS

2848HT	15/12/1950	CAVEAT CAVEATOR - COMPUTERSHARE TRUST COMPANY OF CANADA. 700,530 8 AVE SW CALGARY ALBERTA T2P3S8 AGENT - S MARY HAMMER "(M & M AS DESC.) DATA UPDATED BY CHANGE OF ADDRESS FOR SERVICE NO. 882008602" (DATA UPDATED BY: TRANSFER OF CAVEAT 972106683) (DATA UPDATED BY: TRANSFER OF CAVEAT 032054248)
122 034 239	01/02/2012	CAVEAT RE : ROYALTY AGREEMENT CAVEATOR - AUDREY LORRAINE SCHNEIDER 9412-99 ST FORT SASKATCHEWAN ALBERTA T8L1T4 M & M AS DESCRIBED.

## Certificate of Title

TITLE NUMBER: 142 118 161

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 25 DAY OF APRIL ,2014

**\*SUPPLEMENTARY INFORMATION\*****VALUE:** \$75,000**CONSIDERATION:** \$75,000**MUNICIPALITY:** STRATHCONA COUNTY**REFERENCE NUMBER:**

872 076 888

**AREA:**

64.7 HECTARES (160 ACRES) MORE OR LESS

**TOTAL INSTRUMENTS:** 002



CERTIFIED COPY OF  
Certificate of Title

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LINC                      SHORT LEGAL  
0019 906 651          2303RS;;D

TITLE NUMBER: 152 310 506  
TRANSFER OF LAND  
DATE: 02/10/2015

AT THE TIME OF THIS CERTIFICATION

ATCO ENERGY SOLUTIONS LTD.  
OF ATTN DIRECTOR INFRASTRUCTURE DEVELOPMENT  
200, 919-11 AVE SW  
CALGARY  
ALBERTA T2R 1P3

IS THE OWNER OF AN ESTATE IN FEE SIMPLE  
OF AND IN

PLAN 2303RS  
LOT D  
EXCEPTING THEREOUT ALL MINES AND MINERALS

SUBJECT TO THE ENCUMBRANCES, LIENS AND INTERESTS NOTIFIED BY MEMORANDUM UNDER-  
WRITTEN OR ENDORSED HEREON, OR WHICH MAY HEREAFTER BE MADE IN THE REGISTER.

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
822 087 002	22/04/1982	UTILITY RIGHT OF WAY GRANTEE - LAMCO GAS CO-OP LTD.
162 014 970	15/01/2016	CAVEAT RE : UTILITY RIGHT OF WAY CAVEATOR - BATTLE RIVER COOPERATIVE REA LTD. BOX 1420 CAMROSE ALBERTA T4V1X3
172 153 348	17/06/2017	CAVEAT RE : ACQUISITION OF LAND CAVEATOR - STRATHCONA COUNTY. C/O STACY FEDECHKO DIRECTOR, PLANNING & DEVELOPMENT SERVICES 2001 SHERWOOD DRIVE SHERWOOD PARK ALBERTA T8A3W7 AGENT - STACY FEDECHKO

## Certificate of Title

TITLE NUMBER: 152 310 506

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE  
REPRESENTED HEREIN THIS 17 DAY OF JUNE ,2017

**\*SUPPLEMENTARY INFORMATION\***

**VALUE:** \$1,200,000  
**CONSIDERATION:** \$1,200,000  
**MUNICIPALITY:** STRATHCONA COUNTY  
**REFERENCE NUMBER:**  
072 441 233  
**AREA:**  
16.2 HECTARES (39.97 ACRES) MORE OR LESS  
**ATS REFERENCE:**  
4;21;55;34;NW  
**TOTAL INSTRUMENTS:** 003